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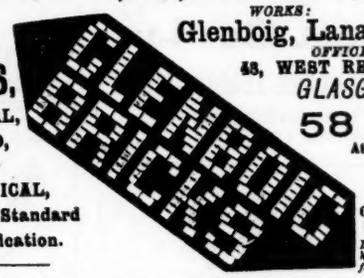

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EDITORIAL NOTES.

Awaiting Royal Assent.

THE Gas Regulation Bill has been piloted through the final passages in the House of Lords; but though the passages were more or less formal, the Association of Local Authorities not Owning Gas Undertakings, and therefore capable of asking for the most impracticable and unnecessary things, and the Railway Companies' Association, contrived to plant in the channels a few sandbanks, which, however, were one after the other safely negotiated by the Marquess of Londonderry, and so did no harm, except to absorb time. We must now say this for the Board of Trade, that the Bill has been skilfully conducted through its parliamentary course by the Board's representatives in both Houses, who set themselves firmly against any amendments being made that they were satisfied were not practical, or which in any way would have been obstructive to the greater technical and commercial freedom for the gas industry which is at the very root of the Beilby recommendations. The report stage of the Bill was taken in the House of Lords on Thursday evening, and the following day it was read the third time. It was then returned to the House of Commons, and approval was given to the Lords' amendments on Monday. There is nothing remaining to be done but to await the Royal Assent.

On report stage in the Lords, Viscount Churchill made an effort to get an amendment passed which was virtually the same as one submitted by Earl Grey in Committee, and then withdrawn. The amendment was to the effect that if, in any case, the adjustment, alteration, or replacement of the burners in a consumer's appliances did not secure efficiency, the Board of Trade might, on the application of the consumer, if they thought fit, require that the undertakers should, at their own expense and within such period as the Board might prescribe, alter or enlarge the service-pipes and meters of such consumer. In this proposal there was fertile ground for endless quarrelling, and infinite work and technical decision by the Board of Trade. This was recognized by the Marquess of Londonderry and by the Board of Trade, before whom the matter had been previously threshed out, and by whom it had been thoroughly considered. If the alteration had been made, gas undertakings would have had to ask that the Board should, before making an order as to the change of a service-pipe and meter, inquire into the adequacy of the house piping between the meter and the burners at which the gas did not burn efficiently, because, where inefficiency is found, it will in the majority of cases be the pipes that belong to the owner or tenant of the house that will be the defaulters, and not the services and meters belonging to the gas suppliers, who in their own interests will see that their business is not interfered with by anything that is remediable by them. Moreover, with the higher statutory minimum pressure that will come into force on Orders being issued by the Board, there will be the greater reason for suspecting that any inefficiency will be due to insufficiency on the consumers' side of the meter. For this reason, as well as for those advanced by Lord Londonderry, there were good causes for refusing to impose an obligation and liability on gas undertakings which it would have been impossible to define. Certain it is that gas undertakings would, with such a clause in the Act, have always been exposed to attack by consumers suffering from whims and fancies. And there are not a few of this genus. But, fortunately, there is compensation in the much greater number of consumers who are perfectly satisfied. The incident, however, only confirms what has previously been submitted—that, in order to ensure sufficiency and efficiency, gas undertakings should have the power, when new installations are made in dwellings and other premises, to specify the sizes of pipes and to inspect the work in order to ensure efficiency.

During the discussion last Thursday, the Marquess of Londonderry made use of a passage the significance of which we wish was as generally present in the minds of members of both Houses as it is in his. He remarked: "I think if "you are going to impose more conditions than are neces- "sary on gas undertakers that you will cramp the enlarge- "ment of the industry, and deter undertakers from using "their ingenuity and inventive powers for the purpose of "producing gas at the lowest cost to the consumer, and in the "most effective way." Such a spirit is not that to which the gas industry has been accustomed in its legislative history. It has generally been treated as something that should be made as immobile as possible by being dressed-up in all sorts of restrictive enactments. Until lately it has never seemed possible to get our legislators to see that enforced immobility reacts as seriously upon the consumers of gas as upon the suppliers. The common traditional view of Parliament was that the more impediment that was put on the movements of the industry, and the more uneconomical it was made in consequence, the greater the safeguard to the consumer. The old traditions are evidently being hustled off their pedestals; and it would be an excellent thing if some of the men whose judgments are warped by those traditions and by the sacrosanctity of precedents met with the same fate. They are the enemies of progress, and of the best methods of rendering public service.

There is an important point as to interpretation. It has been considered in the gas industry that the minimum pressure of 2 in. was only obligatory in any main or pipe having an internal diameter of 2 in. This 2 in. internal diameter, the Marquess of Londonderry says, only refers to the pipe between the main and the meter, and that a minimum 2 in. pressure will have to be maintained in all mains whatever be their size—notwithstanding that the internal diameter of the main may be below 2 in. This interpretation would not have been correct as the clause originally stood. The provision then read: "The minimum permissible pressure shall "be such pressure in any main or service-pipe of 2 in. diameter "and upwards as to balance a column of water not less than "2 in. in height," &c. The gas industry was then right in its interpretation. But now the clause has been remoulded from time to time until the opening lines read: "The mini- "mum permissible pressure shall be such pressure in any "main, or in any pipe laid between the main and the meter "having an internal diameter of 2 in. and upwards," &c. If there was a comma after the word "meter," Lord Londonderry's interpretation would not have been correct, and that of the gas industry would have still held good. But the comma is missing; and it is clear that the gas industry has lost the protection as to pressure that it had in respect of mains under 2 in. internal diameter.

A New Gas Wages Claim—Is Honourable Dealing Dead?

A NEW turn has been given to the question of gas workers' wages by the sectional strikes that took place recently, and which had the effect of producing one of the finest Gilbertian situations from the side of the workers to which an indusiry has ever been exposed in the relations of employers and employees. The ground of "National" demand, negotiation, and settlement was chosen by the workers through their Union and the Federation of General Workers, to which the Union belongs. A national agreement was duly realized; but it was rejected by sections of the workers, and loyally accepted by a greater number. Discontented

ones went on strike; but after a period of unremunerative leisure, and the withdrawal for several days in important areas of a valuable item among the necessaries and conveniences of domestic and industrial life, the national agreement was referred to the Regional Councils in the areas concerned, with the idea that they should revise the terms, or move for their revision. The matter was not referred by the disaffected ones direct to the national tribunal who had originally arrived at the agreement. If things are to be done in a constitutional manner, there is only one proper course to take, and that is not for the men who are disappointed with a national agreement made in their names to throw law and order to the four winds by striking, but for appeal (if there is justification for it) to be made to those by whom the settlement was effected. If the workers consent to collective bargainings and agreements on a national basis, then they have no right to reject or to strike when a settlement is made. It is, however, well within the right of the gas undertakings to say, after what was experienced in the Manchester district, at Bristol, and elsewhere, that they decline to be exposed to disloyalty of this kind, and that they will have nothing more to do with national negotiations and agreements, but that they will revert to the old method of these matters being dealt with direct as between master and man. If the unions do not want any retracing of steps to the former conditions, then they must do something to maintain better discipline, better recognition of honourable dealing, and loyal observance of agreements in and by their rank-and-file.

The leaders of the Unions see this. They are fully aware that what the Manchester, Bristol, and other men have done has not added lustre to their own dignity, nor has it maintained intact or inviolate their power. We are sorry for the leaders, because such doings as the industry has been witnessing in a relatively few places has made their position as negotiators very uncertain; and they have now no guarantee that what has occurred in this instance will not occur again. It is all very well for them to assert that a demand is made, is to be negotiated, and the result is to be observed on a national basis, if from their own side there is to be this breaking away, or a demand for changes in what has been deemed to be a final settlement. There was yesterday week a national conference of the delegates of the Unions involved; and they reaffirmed that future action on the wages question must be national. But what is the use of resolution and reaffirmation of the kind if they have no assurance that the workers will abide by the results of what is done in their name? At this same conference it was mentioned that terms had been offered to the gas workers in the north-western area which were improvements in regard to holidays and overtime and week-end rates. These terms (which were given on p. 194 last week) were commended to the favourable consideration of those concerned.

A much more important matter, however, is that it was decided by the conference to make a request to the Federation of Gas Employers to re-open negotiations on a national basis in view of the recent sectional strikes among gas workers. But the "re-opening" is to be not a reconsideration of the former claim, but a new demand additional to the settlement of that claim. The Unions are now asking for a further 1s. per shift or day for pieceworkers, and 6s. per week for time workers, which means the doubling of the flat-rate increase granted under the settlement to which the very unions who are now making this new demand agreed only a month ago. The increases are to apply to all adults and juniors, whether male or female. Apparently the leaders are seeking restoration in the favour of their disaffected members. We cannot profess any admiration for these tactics. There are many more gas workers who have not expressed discontent than the number of those who have done so; and there is no reason whatever why in the case of the contented undertakings, there should be any disturbance of the still new agreement. If 1s. a day or shift, or 6s. a week, as the flat-rate increase was, in the combined wisdom of the leaders of the Unions constituting the Federation of General Workers, a legitimate and reasonable thing (with the other concessions) a month ago, then nothing has transpired that justifies the 1s. per day being converted into 2s., or the 6s. per week into 12s. As a matter of fact, we have heard of no mandate from the men to make the demand. The Manchester, the Bristol, and other men struck for compliance with the 10s. request, in place of the agreed 6s., and that is what they urged throughout the strike should be insisted upon. The new application is unreasonable and altogether bad; and we hope the Federation of Gas Employers will (if they have not already done so) give it an unqualified rejection, and that there will be no independent negotiations or concessions by gas undertakings. It is quite clear (we are speaking entirely for ourselves in this matter, and in no sense for the Federation of Gas Employers) that the leaders of the Unions and of the Federation have in overflowing measure abandoned themselves to the pressure of those who have shown such bad faith in the disaffected areas. We are disappointed.

Respite from the Corporation Tax.

THERE will be gratification among statutory gas companies (we are not sure that it will be so in the case of non-statutory undertakings) that, at all events for three years, they, in common with other legislatively controlled public utility concerns, are not to have the corporation tax added to their already excessive burdens—more excessive, owing to legislative limitations, than is the case in ordinary trading concerns. It cannot be said that we like the new tax in any circumstances; it is only a further addition to the existing taxes on income under a new name. But it will not be a deduction, as in the case of income-tax, from the interest and dividends payable to the stock and share holders. One danger is that its establishment will provide the Chancellor of the Exchequer with a new elastic means of obtaining extra revenue to the disadvantage of industry and trading; for the money required for the tax will have to be provided in the price of the commodity or service rendered, and so the consumer will again pay. However, Mr. Chamberlain on the 27th ult. announced the exemption from the tax of public utility concerns for three years; and Mr. Baldwin later moved a proviso which carries out the promise. The terms are: "Provided that this part of the Act shall not "during the period of Jan. 1, 1920, and Dec. 31, 1922, apply "to the profits of: (1) A company which carries on wholly "in the United Kingdom any gas, water, electricity, tram-"way, hydraulic power, canal, or railway undertaking, and "which by, or by virtue of, any Act is precluded either from "charging any higher price or from distributing any higher "rate of dividend than that authorized by, or by virtue "of, the Act; or (2) any company being a building society." The proviso shows why there is doubt as to the inclusion of non-statutory companies. "And which by, or by virtue "of, any Act is precluded," &c., are words that are indicative of exclusion. Mr. Baldwin gave the information that the amount of the taxes which it was estimated would be payable by the companies referred to would represent about £2,750,000 a year.

It must not be taken, however, that the three years' exemption means that gas or other public utility companies may be permanently immune from the tax. It is just as likely that they may not be as that they may be. Mr. Chamberlain does not inspire any hope of continued good fortune in this respect. He only looks upon the three years as a period giving an opportunity to Parliament to review the position of statutory companies before in their case the tax is levied; and Mr. Baldwin declared during the discussion that there is no intention of allowing statutory companies to escape the tax for any more than the "proba-"tionary" period. But the three years' concession is proof that the Chancellor and the Government have been persuaded that the terms and conditions on which statutory companies operate never contemplated a tax of this kind; and a 5 p.ct. tax would necessitate considerable alteration of the terms and conditions, and the only result must be that the patrons of the public utility concerns would have to pay. Public utility concerns can make out a good case for the price of their services being kept at as reasonable a level as is possible. In the case of gas, for example, the national advantage of price being made as attractive as conditions allow, so that gas is used in preference to solid fuel, cannot be challenged. Smoke abatement, labour saving, the transmission of fuel by underground means, and the fact that gas has become so largely the fuel of the poor for proper cooking, and so health comes into the reckoning, are reasons (among others), and reasons of national importance, why gas companies should be permanently exempt from a super-tax of the kind. When the time comes for Parliament to reconsider this matter, there is no doubt the gas industry will be able to put up very sound arguments for exclusion; and it is hoped it will be successful.

The words will be noticed in the proviso "a company "which carries on wholly in the United Kingdom;" so that British companies providing similar services abroad are not excluded. An attempt was made during the recent discussion to include all such companies in the proviso. But this was flatly refused. The refusal will make the position very hard for many of them. There are a number of them working under concessions and contracts with fixed prices; and they will have some difficulty in getting the authorities who are parties to the concessions or contracts to grant any alteration of price on the ground of new taxation in this country. There has already been a marked exodus from this country of such British capitalized concerns to the countries in which their operations are carried on, in order to avoid the high rate of taxation here. We know of one company that, converting itself from a British company into a foreign one—that is to say, concentrating its chief office and administrative work in the country in which operations are being carried on—will save several thousand pounds in taxation, and thus help to increase the dividend, which has become very attenuated through the war, and the new prices of coal, material, and labour. The corporation tax must have the effect of giving increased volume and momentum to this movement.

Sulphate Production Decline—The Direct Process in Gas-Works.

THERE are two matters that particularly arrest attention in the annual report of the Chief Inspector under the Alkali Works Regulation Act (Mr. W. S. Curphey). The first is the considerable falling-off that there was last year in the production of sulphate of ammonia, aggregating all sources, compared with 1918, and especially with 1917, which was the year in which the producers were successfully urged to give of their maximum, in order that as much as could possibly be spared for home fertilizing purposes could be applied to the land. The total production of ammonia products last year by the carbonizing industries and plants, expressed in terms of sulphate (24½ p.ct. nitrogen), was down to 397,513 tons, which is a decline on the 1918 yield of 35,038 tons, and—this is a big reaction—as much as 61,104 tons in arrear of that maximum year of 1917, when 458,617 tons were produced. Last year's production, too, falls short of the years 1914 and 1913, in which the production from all quarters was respectively 426,412 tons and 432,618 tons. Looking down the returns from the contributory sources, we see that gas undertakings in producing 173,501 tons last year were only 40 tons behind 1918, but 14,977 tons below the output of 188,478 tons in 1917. In 1913, gas-works produced 182,180 tons, and 175,930 tons in 1914. Last year there were reductions all along the line—from iron-works, shale-works, gas-producer plants, and coke-ovens. The last-named are the second largest producers; but their contribution in 1919 was only 144,367 tons, which was 20,081 tons below the 1918 yield, and 21,977 tons under that of 1917.

These are substantial figures; and it is difficult to assign definite reasons for such a large drop. Since munition work ceased, there has not been such great pressure for metallurgical coke. Again the quality of coal has not been of any assistance in securing high makes of sulphate of ammonia per ton. But the same could have been said in 1917, when gas-works did remarkably well. Then much more gas was sold last year than in 1917; but water gas and steaming have been reducing the call of the gas industry on our coal resources. We were told only last year, by a representative of the Coal Controller's Department, that gas was being produced by these means to an extent which represented a saving of coal to the amount of about 3¼ million tons; and 3¼ million tons of coal, if yielding an average of 25 lbs. of sulphate of ammonia per ton, would add 36,272 tons of sulphate to the production. But this does not apply to any of the other sources of production; and we are afraid there has been some slackening off in the efficiency of production from the time when there was a special call made for it. In the shale industry of Scotland, the decline in output is partly attributable to labour troubles leading to an interruption in the working of the shale retorts; and at the present time the future of that industry is cloaked in uncertainty. There have been some rumours that, with the increased costs of operation, it may be necessary to cease working altogether. As time progresses, however, there may be compensation from the development of the Norfolk shales.

Among miscellaneous subjects, Mr. Curphey comments on the increasing production of higher-grade sulphate—dry and neutral. The advantages of such sulphate are being more widely recognized; and the demand for it, we believe, will be a compelling force in ensuring that the older product, with its acid and moisture content, will become a diminishing quantity. A year ago we called attention to an item of information in the then report to the effect that a plant had been constructed for producing a ton of sulphate of ammonia per day on the system invented by Prof. Cobb for utilizing the sulphur contained in coal for fixing the ammonia in gas as sulphate of ammonia without the use of sulphuric acid from outside. The present report tells us that the plant has been technically successful; but it is evident that commercial efficiency in respect of costs of labour and power has not been all that is desired. However, where technical efficiency has been gained, Prof. Cobb is not the man to neglect any effort to secure, if at all possible, the necessary complementary part of commercial efficiency. To this end necessary modifications of the plant are at present being made; and we hope that there will be success in this particular.

It is not a good tale (which is the second matter to which we referred in the opening lines of this article) that Mr. Curphey has to tell respecting the direct and semi-direct processes of sulphate making in gas-works. Satisfactory results are secured in coke-oven works; but the conditions are altogether different from those obtaining in gas-works. It will be remembered that to secure technical and scientific improvement, Mr. Curphey and his assistants have liberally devoted a considerable amount of attention to this subject, and have explored all the avenues that occurred to them along which to realize better productions, and to surmount the difficulties that were found to occur in association with gas purification. This is a problem which does not arise in connection with coking plants; but it may do so where the gas is supplied in bulk to gas undertakings for urban use. Apart from the recovery figure, the efficiency of the plant where supervision is of the careful order leaves little to be desired; but the gas-purifiers have thrown on to them the burden of dealing with the whole of the foul gases from the process in the crude coal gas. In addition, according to the report, the improvements that have been made have done little to lessen the cost of labour in the sulphate-house. These experiences have caused some of the owners to let the plants stand idle, and some have reverted to the older method of working. At the same time, the costs of production per ton compare well with the older form of distilling the gas liquor, as will be seen from the tabulated statements given in the part of the report published this week.

The disadvantages outlined in the report (obstinate as they may be to subjection in practice) do not harmonize with the optimistic views as to success which have been published from time to time. However, we are grateful for the investigation and thought Mr. Curphey and his assistants have so generously bestowed upon this matter, especially with the view of making a working success of the direct plant in the smaller works. It does not appear from it all that it is so much the process that is at fault as the difficulties which arise from it in connection with the purification of gas.

The Tale of the Continuous Recorder.

It is impossible to congratulate the Sheffield Gas Consumers' Association upon their fairness. A short time ago widespread publication was given, through the report of the Board of Fuel Research, to the results shown on certain charts which had been obtained by the Association by the aid of their continuous recording calorimeter. It was shown that some one had been putting the Sheffield Company in a very false position by the distribution of gas of richer calorific value than the normal during the period the Corporation examiner was making his test. We have previously referred to this matter—have protested against such a fraudulent proceeding being regarded as common in the industry, and have expressed our strong conviction that the Directors of the Company knew nothing whatever of such doings. In short, such a piece of malpractice is fortunately isolated. The annual report of the Sheffield Gas Consumers' Association keeps the matter alive by further reference. All that is said, however, as to subsequent experiences is that "when the Company's attention

was drawn to the matter, the wide fluctuations ceased." The regrettable happening over which there has been so much fuss, skilfully worked-up by the Association, occurred away back in the early part of last September—nearly eleven months ago. The continuous recording calorimeter has been at work since. Has there been a recurrence of anything of the kind, or have the charts shown fairly level curves? We may take it that, if there had been a repetition of the incident, the Association would have made a good "song" about it. This is why they linger on the old note, but do not show much graciousness by neglecting to follow up with information as to the subsequent part of the tale of the calorimeter.

The Non-Statutory Pariahs.

Non-statutory gas undertakings will have to give careful consideration to their position. They are being left out in the cold in all directions. If our reading is correct, they will not be exempt for three years from the corporation tax the same as statutory gas undertakings—a matter dealt with in our editorial columns to-day. They are also excluded from the Gas Regulation Act, seeing that it will only apply to "any local authority, company, body, or person authorized to supply gas by any Act of Parliament, or any Order having the force of an Act of Parliament." And "it shall not be lawful for any person to charge for the supply of gas according to the number of British thermal units supplied unless authorized to do so under this Act or by Special Act of Parliament." It looks as though the sooner the non-statutory concerns bring themselves under legislative control, or link their fortunes with a larger neighbouring company, the better for their future. We know it is hard to abandon liberty; but this is a case in which liberty has its drawbacks.

Fuel Economy Committees.

The organization of bodies to investigate the question of fuel economy appears to have gained great favour. We have the Board of Fuel Research; and there is the Fuel Economy Committee of the British Association, with Prof. Bone as the enthusiastic Chairman. Now the Federation of British Industries have appointed a Committee to inquire into the question of efficiency of fuel use in industry; and again Prof. Bone is Chairman. So far the British Association Committee do not appear to have made much impression upon industry; and so perhaps the closer association the new Committee will obtain through the Federation with the industries of the country will assist in the promotion of a more efficient and economical use being made of fuel in the industries. There is room for it. Mr. G. W. Andrews, M.Sc., F.I.C., is to be the technical assistant. Entrance upon the work is to be made by first investigating gas-producing and steam-raising plant. The average efficiency of the latter is very poor; and Mr. E. W. L. Nicol, who is a member of the Committee (representing the National Gas Council), will no doubt be able to supply his colleagues with some very valuable information, as this is quite a pet line of his.

Trade Unions and Co-Partnership.

There was an interesting and instructive discussion in the House of Commons the other night on the subject of co-partnership. It arose on a proposal by a member to amend Clause 11 of the Ministry of Mines Bill to enable the Boards to formulate and establish systems of co-partnership or profit-sharing between employers and employed, so as to give the miners a personal and financial interest in the business in which they are engaged. There is one thing that was very noticeable in the discussion as reported in brief in the daily papers. None of the speakers raised any objection to the principles of co-partnership, but what objection there was appeared to be centred in the notion that any compulsory introduction of co-partnership would simply create greater dissension between trade unions and employers. If this is so, then it shows the starting-place in the work that has to be done to secure the reform, which need not in any way interfere with the legitimate objects and work of trade unions. The President of the Board of Trade (Sir Robert Horne) is convinced, from what he learned while at the Ministry of Labour, that a great deal of educational work would have to be done before working people came to believe in co-partnership. Working people would very soon believe in it if the trade unions could be converted, and would give the lead. If anyone ought to know it is Mr. Clynes. He is a thorough advocate of co-partnership, and recognizes great advantages in it if it is worked in the right spirit and in the right way. He puts his finger on the barricade to progress. "Some trade unionists believe it would take the soul out of trade unionism." But he is not of that way of thinking; and we see no reason why trade unions should stand in the path of their members securing any material benefit accruing from co-partnership.

Illustration from the Gas Industry.

The gas industry proves that trade unionism is not affected by co-partnership working. Gas undertakings operating under such schemes do not work inharmoniously with trade unions. Why should they? The trade union workers in these companies have capital—accumulated out of their individual share of profits—on which dividend is paid; and, in normal times, the capital is increased as the profit-sharing grows. We look at the block of capital that gas co-partners hold; and, for the life of us, we cannot imagine what trade union leaders can genuinely say against the members being each a part proprietor of the capital. A co-partner has more real freedom in life than one who is not a co-partner; and yet both may be trade unionists, but the one less fortunate than the other. Are trade union leaders afraid of their members enjoying an additional privilege? If it were our lot to be a leader in a trade union, co-partnership would be a prominent item in our policy. The amendment was not inserted in the Bill. But who is going to start, and then keep going, the necessary educational propaganda among the trade unionists? We should say that this is work the Ministry of Labour could with advantage take up.

World's Coal Output.

The Coal Association has just published figures which show that the world's production of coal during the last completed year (1919) stood at the lowest figure since 1910. The total production last year was 1,170,000,000 metric tons—lower by 10 millions than the figures for 1910, and a decrease of 171,000,000 metric tons compared with the figures for the last pre-war year, 1913. Great Britain is responsible for very nearly one-third of this enormous decrease in production; her output dropping from 292,000,000 metric tons in 1913 to 237,000,000 tons in 1919. The United States, which is rapidly becoming our rival in the coal markets of the world, is the only country to show an increase. After dropping from 517 million tons in 1913 to 466 million and 482 million tons in the following years, the coal production of the United States rose to 535 million tons in 1916, 591 million tons in 1917, and 621 million tons in 1918. The slackness on the part of British miners is largely responsible for the position of this country in coal output; and if things go on as they are doing now, we shall see the United States in stern competition with us in our overseas markets. Cardiff depends much on the export of coal; and the City Council last week were discussing the matter of the reduction of exports. It is a critical matter for Cardiff.

Presentation to Dr. E. W. Smith.

The staff of the Birmingham Gas Department bade farewell on Monday evening last week to Dr. E. W. Smith, until recently Chief Chemist at the Corporation Gas-Works; and, in their name, Alderman J. H. Lloyd (the Chairman of the Gas Committee) presented him with an appointments watch, and a wallet of notes with which to purchase a cabinet. Alderman Lloyd stated that Dr. Smith entered the employ of the department in 1910, and had done excellent work. He held a position of standing in the gas industry; and during the war his services were frequently sought by the Government—particularly in connection with the rolling mills at Southampton. Mr. A. W. Smith (General Manager) stated that Dr. Smith possessed a rare combination, in that he had a commercial mind and sound scientific knowledge. He started the "Birmingham Corporation Gas Department Magazine," of which he was its first editor. Mr. T. F. E. Rhead, who is the new Chief Chemist, stated that Dr. Smith was democratic in the finest sense of the word, and was thoroughly impartial. Rapid success had not spoiled him. Messrs. Branson and Scarrott joined in the tribute on behalf of the workmen, and others who spoke were Messrs. J. Foster, T. H. Hack, E. B. Tomlinson, J. Hewett, R. J. Rogers, and Dr. Walter. Dr. Smith expressed his warm appreciation of the gift, and stated that the time he had spent with the department had been thoroughly happy. He acknowledged the splendid opportunities afforded by the Gas Department for scientific research.

PERSONAL.

Mr. JAMES MACLUSKY has been appointed Engineer and Manager to the Calverley and Horsforth District Gas Company. He is the eldest son of Mr. W. B. MacLusky, the Gas Engineer at Halifax, and was educated at Perth Academy, obtaining his engineering training with Messrs. Balfour and Co., Ltd., Leven, Fifeshire. From 1912 to 1915 he served as Junior Assistant at the Halifax Gas-Works, being appointed then as Chief Technical Assistant at the Huddersfield Gas-Works. He joined the Royal Air Force in 1918, and resigned his Huddersfield appointment before demobilization, in order to take-up his present position as Works Superintendent at the Halifax Gas-Works, which position he now relinquishes. Among other certificates, he has first-class honours in "Gas Engineering" and "Gas Supply." He is President for the year of the Yorkshire Junior Gas Association.

Reverting to last week's announcement of the retirement through ill-health of Mr. H. T. ADKINS, the Assistant Secretary of the Primitiva Gas Company of Buenos Aires, Ltd., as from June 30 (when he was awarded a pension appropriate to his length of service), it may be pointed out that his association with the gas industry in the Argentine Republic dates back 32 years, when he joined the staff of the London Office of the Belgrano Gas Company, which undertaking, in 1897, merged with a native concern, La Campania Argentino de Gas, under the title of the River Plate Gas Company. Mr. Adkins was a valued member of the staff of this latter Company, and in 1906 was appointed to the post of Secretary. In 1910, on the merging of his Company and the Buenos Ayres (New) Gas Company with the Primitiva Gas Company of Buenos Aires, Mr. Adkins became Assistant Secretary in the combined undertaking—a position which he always held with the greatest credit. He enjoyed the affection of a wide circle of friends, whose best wishes follow him in his retirement.

Mr. J. W. TURNER, the Secretary and Manager of the Mirfield Gas Company, completed fifty years' service with the undertaking on July 25. The position of Manager was occupied by his father, the late Mr. James Turner, from 1856—on the establishment of the works—to his death in 1869. Mr. J. W. Turner was sent for from school, at the age of 11½ years, to take-up the duties of a clerk at the time when the Secretary of the Company was the late Mr. Charles Walker, a Dewsbury solicitor. Mr. James Turner was succeeded in the managership by Mr. Charles Turner, who was no relation, but had been closely associated with Mr. James Turner in work at Wakefield before either of them joined the Mirfield Company. When Mr. Charles Turner retired, in 1898, Mr. J. W. Turner became Manager; and in 1907, on the retirement of the late Mr. Samuel Day, who succeeded Mr. Walker in the secretaryship, Mr. Turner became Secretary as well as Manager. During Mr. Turner's fifty years' service, the works have been entirely reconstructed, the undertaking greatly extended, and the output increased by 70 p.ct.

ELECTRICITY SUPPLY MEMORANDA.

THE preliminary reorganization work of the Electricity Commissioners is proceeding, and is well in hand. They have been busily engaged in cutting-up the country into electrical areas, each of which is to be the scene of a great co-ordination of electricity generation and transmission. We have from time to time called attention to certain of the areas, when information has been published as to the boundaries which the Commissioners in their wisdom have been pleased to give them. The principles upon which the Commissioners have proceeded in defining the limits are not known; but all sorts of considerations would doubtless affect the lines that they have drawn as the limits of an area. There may be amendments of the boundaries as inquiry is made; but it can be well understood that geographical, fuel, water, transport, and diversity of demand on the generating stations are considerations that have all been taken into account. It cannot, however, be expected that all districts will have equally advantageous conditions. Residential South will not be so well circumstanced in many respects as Industrial North. However, the latest areas that have been defined are the London and Home Counties district, the Mersey and West Lancashire district, and the North Wales and Chester district. We will not describe the limits of these areas, except to say that the London area is a far-reaching one—including the City of London, the counties of London and Middlesex, the county of Berks down to Windsor, and part of the counties of Buckingham, Essex, Hertford, Kent, and Surrey. The boundary line of this vast area is drawn with such freedom that it seems to us that not tens but hundreds of important and other towns and villages outside London will be embraced. Some of the districts may benefit by the consolidation; others may through the benefit gained in some places find that they are not profiting more than they would have done by being left undisturbed in the free development of their generating facilities for their own compact and lucrative areas. It may also be taken that many a small district will now be brought within the range of distributing cables; and so in country areas the gas industry will have more competition than heretofore. Upon this the gas industry will bring to bear all its resources, including a greater centralization of production; and as the electricity industry has been realizing lately, the prime commodity of its competitor has inherent advantages which electricity does not possess. The keener competition will not come all at once; it will grow. The electricity industry will have to make pay all the work and expenditure associated with its reorganization and new conditions; and therefore it will have to put out its best energies. As yet, however, the scheming has only got to the mapping-out stage.

Divisioning the Country.

Parlous Case of the Small Companies.

Many of the small electricity concerns are in a really bad way. They have no rates to fall back upon, as have the local authority undertakings. Their limitations for business are of a very restricted order; the narrow measurement of the quantity of business they can do within these limits is very pronounced; the prices they have to charge have reached the maximum; and maximum prices for electricity, *plus* the cost of installation, curb the room for expansion. The "Electrical Review" pleaded the other week for these small undertakings; but what can be done other than raise the maximum charges (which impose further restriction the higher they go, not only on new business, but on consumers' use of the current), and confer power to raise debenture or preference capital at a higher rate of interest, upon which, in the parlous conditions of the concerns, the existing shareholders will not look with any degree of happiness. We are sorry for these concerns, just as we are for the small struggling gas undertakings. But we cannot forget the picturesque and exaggerated estimates that were originally made by the electrical advisers who urged that these companies should be started, and that the results would be golden. The "Electrician" points the seriousness of the situation: "Some of the companies are saying flatly that they will have very shortly to go out of business; and the number of companies or undertakings thus involved is not only large, but spread all over the country. Some undertakings cannot cover even their operating costs. None of them has the remotest chance of either getting fresh capital or even raising debentures. The situation is bad for everyone concerned; and matters for some time past have slowly been drifting from bad to worse." This is a doleful state; and our contemporary not being able to advise constructively, passes the problem on to the Electricity Commissioners, who must be almost overwhelmed with the detail of their work. They are not to be envied. We agree that they are a body of men acquainted with every item of the electricity industry's affairs, and lacking neither in initiative nor good will. It declares, however, that "the only hope rests in their taking speedy action." What speedy action can they take other than the steps necessary to raise the price of current to a level which will curtail business? We believe they are seeking an extension of their powers for the purpose of granting "relief" by such means.

Price and Business Development.

Edmundson's Electricity Corporation, Ltd., is one of the combinations of concerns that is feeling very acutely the great metamorphosis that has taken place in economic conditions. Costs have doubled, and now have all but trebled. The total increase of the costs of coal and wages to the Corporation have since 1914 been upwards of £250,000 per annum, quite apart from the heavy increases in rates, taxes, repairs, and all other items of costs. Nevertheless, 10d. per unit is the highest figure to which they have been allowed to raise their rates, while in some cases they are limited to 7d. Preference and ordinary dividends cannot now be paid. The "Electrician" is apparently of our way of thinking as to whether an increase of price would have the desired effect. Of course, for any commodity subject to competition there is an economic limit in price, to exceed which means that consumers will either not pay it, or will reduce their consumption. In competition for lighting, electricity has no margin of advantage, nor has it in industrial power, and it has always had a big disadvantage in competition for all forms of heating. This being so, the weak electricity companies will labour under a serious business handicap in seeking relief through higher prices. Our contemporary suggests that what is wanted is an energetic period of reconstruction; and for this fresh capital is necessary. But here again it comes up against the blank wall of difficulty in raising "fresh capital when the probable dividend is zero, and 6, 7, and 8 p.ct. can be easily obtained elsewhere." How, too, is an "energetic period of reconstruction" to be secured in confined areas with a 1s. or 1s. 2d. charge for current?

Thermo-Dynamic Efficiency of Power Stations.

Our friend the "Electrical Review" has been examining into the question of the thermo-dynamic efficiency of power stations, and has reluctantly come to the conclusion that there is no ground for great hope that any considerable advance can be made upon the best efficiencies now secured under ideal circumstances. It does not put the position quite so bluntly as this, but that is what the article amounts to. Of course, the "Review" does not like the statement of fact that the electrical industry loses something above 90 p.ct. of the heat energy of the coal it uses in securing something less than an average of 10 p.ct. But there is the fact

that a station that consumes only 3 lbs. of 12,500 B.Th.U. coal per KW. hour (which is very good working as things go in electricity generation, taking the country through) expends 37,500 B.Th.U. to provide only 3420 B.Th.U. in the shape of electrical energy. The efficiency of such a station is little more than 9 p.ct. Boilers may be worked, under exceptionally good operating conditions, at 80 p.ct. efficiency, and turbines of large size will convert 70 p.ct. of the available heat in the steam into electrical energy at the switchboard. But there is much difference between estimates based upon the total heat the fuel contains, and on the heat which is available for use. Only a portion of the heat generated in the furnaces is available. So the problem is how to increase the proportion of available total heat, and how to increase the efficiency with which the available portion is utilized. To this bifurcated problem, our contemporary applies theoretical considerations. As a result, it finds what others have found before, that the gain in possible efficiency of a steam plant is not very great, even when going to the practical limits in regard to pressure and temperature. As a matter of fact, in actual practice, our contemporary agrees that "we stand to gain less by extreme pressures and temperatures than one might at first imagine. Supposing that a combined efficiency of boilers and turbo-generators of 65 p.ct. can be reached, the thermo-dynamic efficiency of the station cannot then exceed about 25 p.ct., even with the highest steam pressures and temperatures contemplated." Any such efficiency is not likely to be even probable; and the "Review" lays down its pen in the confident belief that the best thermo-dynamic efficiency already realized, under as near as possible ideal conditions, represents very closely the utmost to be expected in central station working. We shall at this rate soon have the "Review" on the same platform as Sir Dugald Clerk.

High Heats in Electric Cooking.

There has not been any talk lately about the shrinkage of meat. Of course, as we have often said, loss of weight of meat has relation to the temperature employed in its cooking. If the highest heats obtainable in an electric-oven are left on (instead of switching-down to the lower heats) by inadvertence, or in order to get the work done quickly, the shrinkage and loss of weight of the meat will proceed just the same as in the gas-oven, if there is no attempt to regulate, which can be done as easily by gas-taps as by electric switches. Now we see that an oven has been designed by the Arora Company for rapidly heating-up. It has top and side heating elements; and the total loading is 4 KW. By this arrangement, it is said that the highest temperature required can be obtained in less than ten minutes. This means that 2280 B.Th.U. will be used, which is equal to 0·67 unit. The description before us says: "The cook dare not leave on the full heat continuously for fear of burning everything up; and so directly the oven is heated, she will get down to the lower heats at which the bulk of the cooking will be done." Will she?

FUEL ECONOMY SCHEME OF THE FEDERATION OF BRITISH INDUSTRIES.

DEFINITE progress has been made with the fuel economy scheme of the Federation of British Industries, which it has been decided to start under the direction of an expert Committee consisting of technical representatives of firms belonging to the Federation who have specialized in the question of efficient and economical fuel practice in various branches of industry. The Committee is composed as follows:

Prof. Bone, D.Sc., F.R.S., Ph.D. (Chairman).
Mr. A. W. A. Chivers (British Electrical Federation).
Mr. F. G. Fryer (Messrs. Rowntree & Co., Ltd.).
Mr. Holbrook Gaskell (United Alkali Co., Ltd.).
Sir Robt. Hadfield, Bart., F.R.S. (Messrs. Hadfields, Ltd.).
Mr. Henley L. Howard (General Electric Co., Ltd.).
Mr. E. W. L. Nicol (National Gas Council).
Mr. H. Stafford Rayner (Armstrong, Whitworth, & Co., Ltd.).
Mr. H. James Yates (Messrs. Wright & Eagle Range, Ltd.).

The Committee have appointed as Technical Assistant (to carry out under their direction the detail work of investigating, reporting, &c.) Mr. G. W. Andrew, M.Sc., F.I.C., who is regarded by them as fully qualified, both by practical experience and academic training, to carry out the duties of the post, which he will take up on Sept. 1.

The work of the department will be confined in the first instance to gas-producing and steam-raising plant. Its activities will probably fall into two main divisions—first, the assistance of individual firms, and, secondly, the assistance of organized trades. Members of the Federation requiring advice will communicate with the Fuel Economy Department.

Mr. John E. Fottrell, who was a Director of the Alliance and Dublin Consumers' Gas Company, and whose death occurred last April, left estate of the gross value of £5373.

The Directors of the Commercial Gas Company have declared a dividend on the ordinary stocks for the past half year at the rates of 3 p.ct. per annum on the 4 p.ct. stock and 2⅝ p.ct. per annum on the 3½ p.ct. stock, payable on Aug. 16.

A MANUAL OF GAS DISTRIBUTION.

By WALTON FORSTALL.

Publishers: United Gas Improvement Contracting Company, of Philadelphia, U.S.A.

[Reviewed by JOHN HENRY BREARLEY, M.Inst.C.E.]

THIS book extends to no less than 942 pages, with an appendix and an index of 4 and 22 pages respectively. In addition, it is preceded by a "Table of Contents" comprising a 13-page record of the 10 parts and 83 chapters into which the work is divided; and 4 pages are taken-up in giving a list of the illustrations. Further, there is a list of schedules, and a list of tool-kits. At the outset, therefore, it will be clearly seen that lengthy though the book is, no effort has been spared to afford the ability to turn to any particular page.

It is impossible to give more than a fugitive notice of the mass of useful information which the work contains. There is nothing like it, or nearly like it, in the whole literature of gas distribution. The author has succeeded in aggregating more information than has appeared before within the compass of a single book on organization, with its personal factors, rules, forms, costing, equipment, and so on, in addition to the descriptive matter relating to appliances, tools, methods of work, and the thousand-and-one other matters which come under the composite term "Distribution." Although comprehensive, therefore, the work must be regarded as concise, remembering the magnitude of the subject. The nearest approach to it in British books of reference is Mr. Walter Hole's "Distribution of Gas;" but in many respects Mr. Forstall plunges much more deeply into his subject, though, to be fair, the converse applies in other cases. For example, it does not treat upon high-pressure distribution or steel-mains.

We learn from the preface that the "editor"—an American lesson in modesty, since we are prone in this country to speak of people who construct text-books as "authors"—accepted an invitation to aid in the organization of a Distribution Department for the Philadelphia Gas-Works. By 1905, rules for workmen, instructions for foremen and superintendents, and routine governing the relations with other departments, had been reduced to writing—pressing physical work having caused the delay. From what was at first only intended for local use, Mr. Forstall began to "plan a book which primarily would teach the prentice hand, in great detail, the principles of gas distribution at ordinary pressures, but which also would have something of value for the adept." It is modestly referred to as only a start towards making available, in convenient form, the accepted principles of the art of gas distribution in America, as such works have hitherto been available from British sources only, and tools, materials, and practice showed very considerable differences between the two countries.

The start is an admirable one; and though a British reader will find the differences in practice reflected in its pages, it is not too much to say that there is material here capable of affording profitable reference to gas distributors, from the smallest to the largest works. It would, perhaps, be better put if we said from the largest to the smallest works, since the subject was confessedly approached from the point of view of Philadelphia conditions in its genesis; and therefore, as a perusal of the book shows, its editor is at home when speaking of works of considerable magnitude, whereas he has to adapt himself when prescribing for the smaller undertakings. Doubtless the fact that it was intended primarily for Philadelphia use only accounts for the omission to refer (except commentatively) to high-pressure distribution or steel mains, which presumably have no part in Philadelphian gas practice.

Chapter I. deals with the administration of a Distribution Department, and extends to 47 pages, divided into eleven chapters. One short chapter, on the "Scope of Work," the editor contends should cover the whole field suggested by the term "Distribution Department," and which he interprets as including the control of pressures. In his view, the larger the company the more important it is that the pressures should be controlled by the Distribution Department. It is immaterial, however, where the control is, so long as the system enables the distribution engineer to get the pressures he wants for giving a satisfactory supply throughout the district mains. The system is defective if the distribution engineer has to "whistle" for his pressure.

Chapter II. treats of the organization of the department; nine-tenths of the space dealing with "large city" (over 500,000 inhabitants) and one-tenth with "small city" (less than 500,000) requirements. This chapter fairly typifies the point of view of the author, throughout the scheme which he portrays of administration generally, though he contends that the component parts of the organization as he builds it up may serve as models in cities of all sizes. It is a chapter—as indeed are the rest of the chapters on administration—to be analyzed by those in control of larger undertakings. Whether the analysis will reveal any ingredient that may be usefully incorporated with their own system will largely depend upon the true up-to-dateness of their existing system. No one will quarrel with the axiom that a capable understudy should be provided for every chief official; so that his mind

may be left free to view his work in its broader aspects. Mr. Forstall's observations hereon show him to be a philosopher as well as an organizer. The book is capable of improvement by showing in diagrammatic form the links between the various officials. For example, the chief control is centred in the engineer and assistant engineer of distribution, immediately following whom come the superintendents of eight subsidiary departments. If we take one of these—say, the superintendent of street lighting, we find that he, in turn, is assisted by a chief inspector, three inspectors, two clerks, a stenographer, and about 140 lighters. So it is, more or less, in the other subsidiary departments. The complete scheme plotted on a diagram would show at a glance the various co-relationships; and this would still further justify and typify the editor's closing observation: "An organization that cannot be diagrammed easily is probably at fault." Two leading principles in planning an organization may be quoted here: (1) "To have enough men for the work, and (2) to have each man's duties well defined, in order that initiative may be encouraged and responsibility properly located."

Chapter III. deals with "Operation by Co-Operation;" and the principal feature is a description of the manner in which superintendents' meetings were evolved at Philadelphia. These meetings are held each Tuesday afternoon; and typewritten minutes are subsequently supplied to each superintendent. These are properly indexed on the card-system; and a periodic digest revision "cleans up" as the months and years go by. Practice is thus kept up to date, and the confusion of obsolescent instructions avoided.

Chapter IV. is devoted to the preparation of rules for workmen. It is merely a short general commentary on the subject, but is full of sound sense. The pith of this is represented in the axiom which is laid-down, that any set of instructions (whether for day labourer or superintendent) that does not receive continual amendment to correspond with the constant changes occurring, soon loses its value as a correct guide to the conduct of workmen.

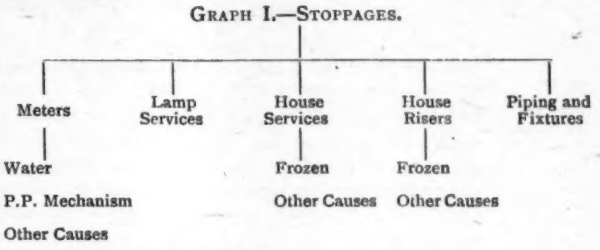
Chapter V. discourses on "The Personal Equation." There is little in it that one would care to disagree with, even from the British point of view. Forces here are too strong to allow an organizer to put into complete practice all the excellent ethical teaching of Mr. Forstall on the human element. It is worth noting that in Philadelphia it is the practice to restrict foremanships to college men, in the selection of whom considerable care is taken. A man's college record is enhanced by personal attractiveness as a candidate for these posts. Foremen are counselled to meet their men [particularly does this apply to fitters] in a body, to lay stress on new rules or on old-standing rules which have been subject to carelessness or misunderstanding. Many gas undertakings in this country work on these lines. But what shall be said of, "all along the line the attempt should be to make each man feel that he is liked, as this policy undoubtedly will increase the output." Superficially, it looks all right—that is, assuming that the man is susceptible to a display of personal friendliness.

Unfortunately, many men will likely take this as a sign of weakness; and our British workmen are not slow to pick holes in a show of kindliness which has no stronger driving force than that of "policy." Nothing succeeds better than a genuine appreciation of a man's good work on its merits on the one hand, and a man's keen desire to do good work on the other. Even so, our trade union system is such that, however strong the desire to increase output may be, a man will quickly become unpopular with his fellows who gives of his best. Right through this treatise with its excellent axioms we are driven to the reflection that the personal element, as distinct from the mechanical or combination element, has much greater potentialities in America than it has here. There is still plenty of scope among the technical officials in this country for getting the maximum degree of service which comes from adequate appreciation. But a good many gas undertakings lag behind in the responsible share of this desideratum which is essentially theirs. Mr. Forstall concludes this chapter: "Select carefully, know individual performance, ask for results, and pay accordingly. The larger the company, the more important will be the resultant saving."

Chapter VI. is devoted to the forms used. It is but six pages long; yet it contains many useful hints on numbering, arrangement, spacing, printing, ruling, size, and material, with some notes on the maintenance and disposition of the forms. Stress is laid on proper spacing where the reports are to be made by workmen using pencils. Lack of this is one of the weaknesses of some of the card-systems now in vogue. With regard to the preservation of forms it is suggested that the length of time over which records shall be kept should be decided, and periodical clearance adopted rather than waiting until lack of storage space compels an ill-considered disposition of a certain percentage. "The smaller the residue kept, the quicker it may be located."

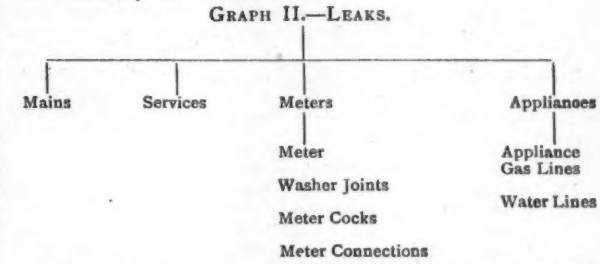
Chapter VII. is a short dissertation on the chief accounts involved. In this connection, Mr. Forstall advocates the universal adoption of the "Unified System of Accounts" as adopted in 1914 by the American Gas Institute. Chapter VIII. comprises notes upon "Operating Data"—more particularly dealing with daily and monthly reports. Graphic representation of the daily report data is recommended as a convenient way of seeing at a glance the relation between different periods. It is a methed which has developed greatly in this country in recent years, and no distribution control can be considered as complete without it. The subdivision of various classes of stoppages may be graphed from the text as follows:

GRAPH I.—STOPPAGES.



And similarly with leaks:

GRAPH II.—LEAKS.



The subdivision is, of course, according to American practice; but it shows the systematic lines upon which they seek to compile data which it is claimed will, with little trouble, afford useful information, and which has dictated some very radical changes in practice.

Chapter IX. deals briefly with "Cost Reports." It is typically American, as witness: "Since man was, the highest achievement has been secured by the existence of a goal to be reached, and of competitors to be beaten. The lowest possible unit-cost is the goal which each superintendent and foreman is anxious to reach before his fellow." And so on. This setting of man against his fellowmen in the accomplishment of "output" has gone strangely out of fashion in this country. Yet it was that which, in a cruder way perhaps, made the Empire what it is. The funny part of it is that in the field of recreation—football, cricket, racing, &c.—Britishers are as keen to get there (or see their side get there) as ever they were. But in the sphere of business and daily occupation, the slogan is, "Please don't mention it." The details of the cost report as used in Philadelphia will be found useful for comparative purposes. What appears an innovation is the inclusion of distribution office expenses in the scheme. The labour cost under this head is examined by dividing the total number of jobs in each district into the clerical labour charged to this account. It is claimed that its effect on office practice has been revolutionary, and were the present unit cost to equal that obtaining when the unit was first shown, it would require $100,000 more than it does to-day. The period of this saving is not stated; but it is presumably over one year. The other costing is divided under nine different heads.

Chapter X. describes the system of "inspection;" and Chapter XI. is a short treatise upon "Accidents, their Prevention and Treatment."

(To be continued.)

Service Charge Plan in Massachusetts.

The inauguration of a service charge in connection with the supply of gas at Springfield, Massachusetts, is announced by the Manager (Mr. J. J. Kirkpatrick). The minimum amount is 50 c. a month, and for the largest meters $1. It is said that this is the first service charge system to be adopted in the State of Massachusetts; and it has been put into operation in a town where there are 300 customers who use $1 worth of gas a year or less. As a matter of fact, statistics show that 40 p.ct. of the customers on the books are unprofitable, because of the small amount of gas used. Thus the large consumers—or 60 p.ct.—must under the old plan pay for the service given to the 40 p.ct. With the new service method, however, the 100 p.ct. pay equally for the service. They are charged at the old rates for the gas used; and the department secure the increased revenue from the service charge. The figures show that it costs $6·98 per customer to serve, and 81 c. per consumer for making gas, under the present system. The cost to the department for making gas for the 300 or more small users who take $1 worth of gas a year or less is $22·28 per 1000 c.ft. For the profitable consumers it cost 82 c. to 91 c. per 1000 c.ft. Yet under the present plan the small consumer gets gas for the same amount of money as the big user; and he does not help to pay for the service. In round figures, 6000 customers are not paying for the service they get; and the balance of the customers must be paying their share. The new system has other advantages. To increase the gas rates on measured service, the increase would have to amount to 33 p.ct. To small users the increase will amount to more than this under the service cost plan; but for big users the increase will be less. If the increase were to be charged on measured service, it would cost about $100,000 to alter the meters, which need not now be done.

THE "DIRECT" PROCESS OF SULPHATE MAKING IN GAS-WORKS.

RESUMING, in the fifty-sixth annual report, for the year 1919 [which was noticed on pp. 179–80 of last week's "JOURNAL"], consideration of the subject of the "direct" process of sulphate of ammonia making in gas-works, Mr. W. S. Curphey, Chief Inspector under the Alkali Works Regulation Act, says the "direct" and "semi-direct" processes, in which the ammonia present in the gases generated from coal by destructive distillation is removed by the action of sulphuric acid, continued to give satisfactory results in coke-oven practice. In the conditions existing in gas-works, however, the experience was different. The problem of gas purification does not necessarily arise in coke-oven works; but in the smaller gas-works especially, the additional and continuous care required by a process in operation at all times is less attractive than one in which gas liquor is distilled as occasion and convenience require, and one by which the efficiency of gas purification is less liable to be effected. There is therefore a tendency to revert to the older style of working. This tendency has already led to change in some cases; and further instances of a similar character are probable. The section of the report which follows is reproduced.

Before departing from the special consideration of this subject, and in making some concluding remarks, it may be convenient to review at this time the work already done, as dealt with in preceding annual reports.

AN HISTORICAL RETROSPECT.

The working of plant for the manufacture of sulphate of ammonia in gas-works by what is known as the "direct" process was made the subject of special study and research during each of the four years 1915 to 1918;* and the Alkali Reports for these years contain a detailed account of the investigations conducted at typical works and the conclusions based on the data relating thereto. During the year 1919 no special inquiry has been undertaken; but certain of the works have been kept under observation, and advice and assistance given on occasions when disorganization threatened, or when improvement of plant was under discussion.

Hitherto, discussion has been directed almost entirely to the conduct of plant on its technical and scientific side, in the hope of effecting improvement in the recovery figure for sulphate and in the working of the purifiers and subsidiary plant connected with the acid washer (or "bubbler"). Financial considerations, however, cannot be disregarded if a technical process, such as the "direct" process, is to hold its own in competition with other and older-established methods. There must be collateral advantages, or departure from current practice is not welcomed by those responsible for the conduct of affairs. It is of interest, therefore, to inquire how far the "direct" process in gas-works has fulfilled expectations with respect to the recovery of ammonia and the reduction of labour charges, and in effecting simplicity of working and control since its inception in 1910.

In a paper read before the Southern District Association of Gas Engineers and Managers, on Nov. 10, 1910,† Mr. Philip G. G. Moon summarized the financial advantages of working the Wareham plant as follows:

> As there is no fuel or labour bill to be met, practically the only charges against the sulphate sold are the cost of the acid used and the interest and depreciation on the plant itself. The capital outlay is, however, so small, and the wear and tear of plant so inappreciable, that these charges do not amount to very much per ton. I estimate that, selling the sulphate of ammonia produced at £11 per ton, there will be a net profit of £7 per ton sold.

At works of the smallest size, such as Wareham, with an output (say) of 5 tons of sulphate per year, no attention was then paid to the collection and distillation of the virgin liquor that condenses. It was simply run to waste. The estimated loss of ammonia, though small in itself, perhaps, was relatively large, and was estimated at Wareham to amount to 5·1 lbs. of ammonia per ton of coal carbonized. Undoubtedly, the problem was thus greatly simplified for works where effluent liquors of this character could be discharged without complaint, both with respect to labour charges and purification practice. At larger works, such as Dunstable, where 2000 to 3000 tons of coal are carbonized yearly, with a production (say) of 25 tons of sulphate per annum, other considerations arise, and more elaborate and costly plant, with attendant increased charges for labour, had to be installed. To the acid washer was therefore added the ammonia boiler, which demanded the more or less constant attention of a skilled attendant.

The expectations formed at this early date of the volume of liquor to be distilled and of the effect of the admission of the ammoniacal vapours and accompanying gases to the acid washer have not been realized in subsequent experience. The boiler first introduced to deal with the virgin liquor soon gave place to an ammonia still of modern type; and lately stills of the intermittent type at more than one works have had to be replaced by more powerful plant of the continuous type. The volume of virgin liquor calling for treatment at many works, far from being 10 to 12 gallons per ton of coal, often exceeds 18 to 20 gallons, and even 30 gallons in exceptional cases. With the larger volume of liquor is condensed a larger proportion of ammonia in the crude coal gas leaving the retorts; and the virgin liquor often contains a larger amount of ammonia than that entering the acid washer direct with the crude gas. This is more especially the case during the winter months, when the volume of liquor will be at a maximum, due in part to the higher moisture content of coal stored in the open, and in part to the increased condensing effect of air condensers and connections at winter temperature.

With the introduction of stills and the admission of the disengaged ammoniacal vapours direct to the acid washer, there ensued, at several of the larger works, prolonged and disastrous periods of disorganization at the purifiers, due to the over-heating of the washers and the passage of an undue amount of moisture to the boxes—disorganization which at that period was only in part avoided by bye-passing a large proportion of the ammonia direct to the purifiers.

The conditions for efficiency are now much better known. The acid washer is kept cooler; drier oxide is now charged in the purifiers; boxes, where exposed, have been protected from the weather, and their temperature regulated by theomometric data systematically recorded; and, of late, further improvement has been effected at the best-conducted works by the adoption of the "backward system" of oxide purification, with downward flow of gases, in place of the older system of working the purifiers successively to exhaustion in series, and with upward flow of gases through the boxes in sequence. Further relief has been afforded, in certain cases, by the introduction of a "neutralizing-box" or "neutralizing-pipe" at the acid washer, to secure a better circulation of acid liquor within the system, and by the use of a preheater at the still; and, lately, at two of the works hoods have been erected over the evaporating pan, and the vapours of steam and pyridine drawn away for discharge at a suitable level outside the sulphate house.

Technically speaking, the efficiency of the plant, as now operated in the best-conducted works, apart from the recovery figure for sulphate, leaves little to be desired; but the process still throws on the coal-gas purifiers the burden of dealing with the whole of the foul gases in the crude coal gas leaving the retorts—carbon dioxide, sulphuretted hydrogen, and hydrocyanic acid—unlike the older distillation process, in which some 25 p.ct. of the carbon dioxide, 7 p.ct. of sulphuretted hydrogen, and a notable proportion of cyanogen compounds are removed before the crude gases enter the purifiers. [See Thomas Holgate's article in the "JOURNAL OF GAS LIGHTING," Aug. 30, 1904, p. 602.]

The technical improvements noted above, though undoubtedly affording relief from disorganization at the purifiers, and affecting some conservation of ammonia formerly lost in the effluent still liquors and at the boxes, have done little to reduce the cost of labour in the sulphate house; and it is now a serious consideration with some managers whether economy would not be effected by a conversion of the acid washer or evaporating pan into a saturator of ordinary type, with storage of liquor for periodic operation of the still, and with diversion of the foul gases to the appropriate purifier or oxide heap. At three works, indeed, the "direct" process has been now replaced by one of the older distillation type, with marked improvement in the recovery figure for sulphate. At a fourth works replacement of the plant has been temporarily suspended pending trial of a suggested modification to permit of the neutralization of the ammonia vapours disengaged from the still in an appropriate lead-lined seal-pot fed with acid liquor continuously circulated from the washer, with diversion of the liberated foul gases—carbon dioxide, sulphuretted hydrogen, and hydrocyanic acid—to an oxide heap suitably placed outside the building.

Items of cost are rarely, if ever, capable of general application; but with standardized prices for acid and ammonia products, and with labour costs tending to equality over larger areas, it may be of interest to compare the cost of recovery in the largest and best-conducted unit of the "direct" process with that existing in works of somewhat similar size and in neighbouring districts where sulphate is manufactured by the older distillation process.

The general question of cost of recovery of ammonia products has not hitherto received much attention in the Technical Press, and detailed statements of cost items are but rarely published. Mr. Thomas Glover ["Reports of Gas Associations, 1914," p. 91] states that it takes some £4 per ton to make sulphate of ammonia after the liquor has been obtained. Mr. Moon allows £4 per ton in his estimate of the anticipated profits obtainable in the

* See "JOURNAL," Vol. CXXXV., p. 606; Vol. CXXXIX., pp. 281, 322, and 372; Vol. CXLIII., pp. 68, and 111; Vol. CXLVII., p. 339.

† *Ibid*, Vol. CXII., p. 474.

"direct" process. Mr. Glover further allowed £7000 for a 2 million c.ft. works for scrubbing and washing appliances to get the liquor, which reckoning 5 p.ct. for interest and sinking fund and for a make (say) of 600 tons of sulphate per annum, would add 11s. 8d. per ton to the cost of the sulphate.

The general cost of recovery of ammonia products is discussed in the final report (1920) of the Nitrogen Products Committee of the Ministry of Munitions of War; but the cost items recorded are incomplete in certain respects, and relate only to pre-war conditions. An analysis of the cost items presented and of the conclusions reached by the Committee is beyond the scope of this memorandum; but in the report are tabulated figures of pre-war costs of large-scale manufacture which may conveniently serve as a starting-point for the tabulated statement relating to certain of the smaller sulphate of ammonia works presented in Tables I. to IV.

Cost of Manufacturing Sulphate from Gas-Works Liquor.

The Committee deal only with "authoritative figures" of the pre-war costs involved in the manufacture of sulphate on a large scale from crude ammoniacal liquor at a self-contained works making its own sulphuric acid, but purchasing crude liquor.

Capital Costs.—The capital cost of the sulphuric acid plant amounts to about £1·75 per long ton of 70 p.ct. acid per annum, or £1·92 per 1·1 ton of acid (the amount required to produce 1 ton of sulphate of ammonia). The capital cost of the plant for working-up the crude gas-works liquor and fixing the ammonia as sulphate amounts to about £4·5 per long ton of sulphate per annum. The capital cost of the complete works would thus be £1·92, *plus* £4·5, equals £6·42 in all, per ton of sulphate per annum.

Production Costs.—The cost of making the sulphuric acid may be placed at £1 per long ton, inclusive of all charges in respect of labour, materials, repairs, maintenance of the plant, and interest on capital. The cost of working-up the gas liquor and fixing the ammonia (exclusive of losses) is as follows:

	Sulphate per Long Ton.
Materials:	
1·1 tons of 70 p.ct. sulphuric acid at £1	£1 2 0
1·3 tons of fuel at 7s. 6d.	9 9
0·3 yard of lime at 10s.	3 0
Manufacturing costs, including labour, repairs, maintenance, general charges, and interest at 5 p.ct.	1 7 0
	£3 1 9

NOTE.—These figures do not include the cost of the crude liquor required per ton of sulphate manufactured, which (allowing for a loss, say, of 2 p.ct. of ammonia) would amount to about 14·7 tons of 8-oz. liquor (1·73 p.ct. NH_3). The market price of such liquor itself would be based upon the market price of sulphate, which amounted (average 1911-13) to £13 16s. 8d. per long ton (24·5 p.ct. NH_3).

The cost of purchased sulphuric acid is given at £1 10s. per long ton, presumably delivered at the consumer's works. Excluding the cost of gas liquor, and assuming a purchase of acid at the above price, the lowest average cost of production of 1 long ton of sulphate at pre-war prices would thus be somewhere in the neighbourhood of £3 10s.

I am indebted to Mr. David Vass (Engineer and Manager of the Corporation Gas-Works at Perth) for the figures as to the manufacture of sulphate of ammonia for the years 1913 to 1918, and presented in Table I. The cost for fuel is arrived at by taking a tenth part of the cost of the total fuel used in the boilers. The sulphate plant is supplied with steam from the same boilers; and a daily estimate is made of the total fuel consumed. All the other items, with the exception of depreciation, are actual outlays for sulphate alone. Depreciation is put at a fixed sum of £62 10s. No sum is allowed for office management, rent of premises, &c., and similar landlord's charges, which would be appreciable in the case of a private manufacturer.

Some of the figures supplied by Mr. Vass are presented in Table II. (Works "C"), together with the average cost items for acid, fuel, lime, wages, and depreciation for the four years 1915 to 1918, to compare with similar figures relating to Works "A" and "B" in the Home Counties. In the latter case, some of the figures—*e.g.*, for lime and fuel (Works "A"), and of fuel (Works "B")—have had to be estimated. This, of course, somewhat detracts from their value, as the fuel item is undoubtedly an important factor in the manufacture of sulphate, and there is certainly room for economy in the fuel consumption at many of the smaller sulphate works.

In Table III. are the cost items relating to the "direct" process at the largest and best conducted Works "E" (Table V.).

In Table IV. the average cost items for the years 1915 to 1918 relating to the three Works "A" and "B" (Table II.) and Works "E" (Table III.), are compared. It is interesting to note the relatively heavy cost for acid in all three works. That for labour is markedly higher in the case of Works "E," operating the "direct" process, 28 p.ct. of the total, as against 17·5 and 17 p.ct. respectively for the older distillation process at Works "A" and "B," and 21·2 p.ct. at Works "C" (Table I.).

Table V. contains a complete list of the "direct" process plants erected at gas-works during the period 1910 to 1920. The recovery figures do not afford much ground for congratulation; but it has to be remembered that war conditions have borne with special heaviness on the smaller works with respect to supplies of sulphuric acid and lime, and local labour conditions have caused considerable anxiety everywhere. Moreover, the coal supplied was often of extremely poor quality, and of a kind not always suited to local requirements.

At several of the works improvements continue to be effected in the face of difficulties, both labour and financial. At Works "E" the recovery figure, 20·5 lbs. of sulphate of ammonia per ton of coal, is not quite up to expectations, in view of the unceasing vigilance of those in charge; but the working of the purifiers, now remodelled on the backward system with downward flow of gases, affords convincing proof of the advantage of applying scientific methods of control to gas-works operations. Thus, continuing the table presented in previous reports, we have:

Year.	Number of Purifiers Changed.	Gas Made, Cubic Feet.	Average per Purifier, Cubic Feet.	Lbs. S/A Recovered per Ton Coal.
1914	14	161,576,000	11,500,000	11·5
After adoption of "direct" process:				
1915	26	169,283,000	6,500,000	18·5
1916	17	152,107,000	8,900,000	21·2
1917*	17	176,885,000	10,400,000	20·7
1918†	10	152,103,000	15,210,000	24·0
1919‡	2	143,316,000	71,658,000	20·6

NOTE.—*1917. Backward system commenced tentatively; upward flow of gases.
†1918. Backward system established; downward flow of gases started March, 1918.
‡1919. Backward system and downward flow of gases in use throughout the year.

The improvement noticed at these works in the amount of ammonia bye-passed to the purifiers, which was reduced to something approaching 3 grains per 100 c.ft. in 1918, has been less satisfactory during 1919. Monthly tests by the works chemist show an average ammonia content of 18 grains per 100 c.ft. for the crude gas entering the first purifier for the twelve months, January to December, 1919, with a maximum test of 25·7 grains in March and a minimum of 7·7 grains in July. This corresponds to about 1¼ lbs. of sulphate per ton of coal carbonized.

Table I.—Cost of Making Sulphate in Gas-Works Per Long Ton. (24½ p.ct. NH_3.)

Ordinary Distillation Process.

Friarton Works of the Perth Corporation.	1913.	1914.	1915.	1916.	1917.	1918.	Average for 1915 to 1918.
Total sulphate made . . . . . Tons	250	216	225	270	276	237	252
Materials:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d. P.Ct.
Fuel (estimated)	5 4·32	6 5·89	6 8·59	7 8 16	10 1·66	14 11·27	9 9 (10·0)
Lime	1 8·16	1 10·91	1 3 61	1 2·08	2 2·01	1 1·85	1 5 (1·5)
Acid	1 12 1·34	1 12 10·75	2 0 9·89	3 10 1·81	3 12 0·53	3 13 6·46	3 4 11 (67·3)
Manufacturing costs:							
Wages	15 4·26	17 9 27	16 1·80	17 2·64	17 7·98	1 10 9·26	1 0 6 (21·2)
Bags and twine	0 4 03	0 1·90	0 2·57	0 4·49	2 5·47	5 8 67	
Depreciation	5 0·00	5 9·54	5 6·73	4 7·55	4 6·25	5 3·34	£4 16 7 (100·0)
Registration fees	0 2·88	0 3·34	0 3·19	0 2·67	0 2·60	0 3·04	
Sundries (including subscription to Sulphate of Ammonia Association)	0 7·93	2 1·66	5 7·86	5 10·10	9 1·12	10 3·33	
Total	3 8 9	3 7 5	3 16 8	5 7 3	5 18 4	7 1 11	
Market value of crude liquor f.o.r. at gas-works, calculated per ton of sulphate of ammonia	3 6 8	3 0 0	5 0 0	5 6 8	5 6 8	5 6 8	
Total cost of sulphate of ammonia as made	6 7 5	6 7 5	8 16 8	10 13 11	11 5 0	12 8 7	
Average price received for sulphate of ammonia	12 7 9	12 7 6	16 2 5	15 5 9	15 6 7	17 3 10	
"Profit" made in sulphate of ammonia house	6 0 4	6 0 1	7 5 9	4 11 10	4 1 7	4 15 3	

TABLE II.—COST OF MAKING SULPHATE IN GAS-WORKS.

Ordinary Distillation Process.

	Cost per Long Ton of Sulphate made (24½ Per Cent. NH_3).						
	1913.	1914.	1915.	1916.	1917.	1918.	Average, 1915 to 1918.
Total sulphate made . . . . . Tons	178	168	157	126	169	177	157
Materials:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Acid	2 2 7	2 2 10	3 4 5	3 3 9	3 1 5	3 11 7	3 5 6
Fuel (estimated at 20 tons coke per month) .	1 2 6	1 3 9	1 18 2	2 7 7	1 19 8	2 0 8	2 1 0
Lime (estimated)	5 10	5 7	3 7	5 10	5 8	7 10	5 8
Manufacturing costs:							
Wages	11 11	12 6	13 6	17 5	1 2 3	2 1 11	1 4 8
							6 16 10
Repairs	3 11	3 7	4 10	5 6	1 9	2 3	3 5
Interest and depreciation on plant (£300) and buildings (£150) at 5 p.ct. on prime cost . .	2 6	2 8	2 10	3 7	2 7	2 6	2 10
Works (A) . . . . . Total	4 9 3	4 10 11	6 7 4	7 3 8	6 13 4	8 6 9	7 3 1
Total sulphate made . . . . . Tons	112	—	135	131	134	128	132
Materials:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Acid	2 18 10	—	2 15 4	5 4 1	7 8 10	7 1 8	5 12 1
Fuel (estimated)	11 1	—	13 9	14 10	15 9	19 2	15 10
Lime	0 10	—	1 7	1 8	3 3	5 6	3 0
Manufacturing costs:							
Wages	1 0 6	—	1 2 1	1 3 7	1 6 2	1 16 9	1 7 1
							7 18 0
Repairs, interest, and depreciation on plant (£300)	10 8	—	8 10	9 0	8 11	9 5	9 1
Works (B) . . . . . Total	5 1 11	—	5 1 7	7 13 2	10 2 11	10 12 6	8 7 1
Total sulphate made . . . . . Tons	250	216	225	270	276	237	252
Materials:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Acid	1 12 1	1 12 11	2 0 10	3 10 2	3 12 1	3 13 6	3 4 11
Fuel (estimated at one-tenth total fuel consumed at boiler)	5 4	6 6	6 9	7 8	10 2	14 11	9 9
Lime	1 8	1 11	1 4	1 2	2 2	1 2	1 5
Manufacturing costs:							
Wages	15 4	17 9	16 2	17 3	17 8	1 10 9	1 0 6
							4 16 7
Depreciation, taken as fixed charge, £62 10s.	5 0	5 9	5 7	4 8	4 6	5 3	4 11
Works (C) . . . . . Total	2 19 5	3 4 10	3 10 8	5 0 11	5 6 7	6 5 7	5 1 6

The amount of ammonia lost in the effluent liquor is now less than formerly, due in great measure to the practice of regular sampling and analysis at the works, and to more careful liming. The average amount of ammonia in the spent liquor returned by the chemist for the twelve months, January to December, 1915, is given as 0·07 p.ct., with a maximum of 0·08 p.ct. and a minimum of 0·06 p.ct. This would correspond to about 1 lb. of sulphate per ton of coal.

Thus, a loss of 2½ lbs. of sulphate per ton of coal has still to be recorded against the process in respect of these two items, even at this well-conducted works. Such loss will certainly be far greater at some of the other works, where scientific control is lacking and means for testing do not exist or are neglected.

Somewhat similar ammonia figures are recorded for Works "G," where tests are taken by the chemist as opportunity offers. Two tests of the gases entering the purifiers showed:

		Ammonia. Grains per 100 C.Ft.
Nov. 20, 1919.	With 1½-inch bye-pass three-quarters open . .	24
Nov. 27, 1919.	With bye-pass fully open	35

Purifier space is deficient here, and on occasions the whole of the crude gases have had to be bye-passed to avoid fouling. Temperature records are still taken, and serve as a guide in controlling the steam supply to external pipes laid in the chamber in which lower sections of the boxes are placed. The effluent spent liquor is regularly tested for ammonia. Of 31 tests recorded by the chemist, the maximum amount of ammonia per 100 parts of liquor is 0·06, the minimum 0·005, and the average 0·019—an excellent result.

Mr. Codgbrook, the manager, has again been unwearied in his efforts to improve the working of plant. He has now in hand a scheme for diversion of the foul gases from the ammonia still to the oxide heap, and is the first manager to have erected a hood over the evaporating pan so as to effect the removal of the pyridine vapours arising from the acid liquors on evaporation.

The results of analyses of samples of the liquor from acid washers, and of samples of sulphate of ammonia fished therefrom and dried on the steam-plate, are significant, and emphasize the importance of preventing the discharge of vapours from evaporating pans at low levels and in the relatively confined space usually allotted to such apparatus in the "direct" process. Thus:

"Bubbler" Liquor, 46·5° Tw., Jan. 29, 1920. As Evaporated in Pan.

	Per c.c. Liquor. Grams.
Ammonium sulphate	49
Acidity calculated as H_2SO_4	0·040
Pyridine bases, calculated as pyridine	0·103
Pyridine bases, calculated per 100 parts of sulphate in liquor = $\frac{100}{49} \times 0{\cdot}103$ = ...	0·2075
Pyridine bases, calculated per ton of sulphate of ammonia, fished	4·7 lbs.

Sulphate of Ammonia Fished from Above Liquor and "Dried."

	Per 100 Parts.
Acidity, calculated as H_2SO_4	0·190
Pyridine bases, calculated as pyridine	0·006
Pyridine bases, calculated per ton of sulphate of ammonia	0·1 lb.

Thus, practically all the pyridine in the liquor—or 4·6 lbs. per ton of sulphate of ammonia made—is evaporated in the pan and discharged into the confined air of the sulphate-house.

In conclusion, I desire to express my cordial thanks to the management of the various works who have contributed data relating to the cost of manufacturing sulphate.

TABLE III.—*Cost of Making Sulphate in Gas-Works.*

"Direct" Process.

Works "E," Table V.	Cost per Long Ton of Sulphate made (24½ p.ct. NH_3).				
	1915.	1916.	1917.	1918.	Average, 1915 to 1918.
Total sulphate made, tons	110	95	117	126	112
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Materials—					
Acid	1 15 8	4 5 10	5 3 6	5 14 2	4 4 9
Fuel (one-tenth of coke used on boilers) . .	6 8	10 8	8 5	8 11	8 8
Lime	3 6	5 6	6 9	10 0	6 5
Manufacturing costs—					
Wages	1 8 10	2 1 5	1 15 6	2 10 0	1 19 2
Repairs, interest on plant, &c. . . .	Not stated	—	—	—	—
	—	—	—	—	6 19 0

TABLE IV.—*Comparative Cost of Materials and Labour in the Manufacture of Sulphate by the Ordinary Distillation and the "Direct" Processes.*

Average Cost, 1915 to 1918.

—	Ordinary Distillation Process.				"Direct" Process.	
	Works "A," Middlesex.		Works "B," Herts.		Works "E," Herts.	
	Per Long Ton of Sulphate.	Per Cent. of Total Cost.	Per Long Ton of Sulphate.	Per Cent. of Total Cost.	Per Long Ton of Sulphate.	Per Cent. of Total Cost.
Total sulphate used, tons . .	15 7		13 2		11 2	
Materials and wages—	£ s. d.		£ s. d.		£ s. d.	
Acid . . .	3 5 6	48·0	5 12 1	71·0	4 4 9	61·0
Fuel (estimated) . .	2 1 0	30·5	15 10	10·0	8 8	6·5
Lime . . .	5 8	4·0	3 0	2·0	6 5	4·5
Wages . . .	1 4 8	17·5	1 7 1	17·0	1 19 2	28·0
Total . .	6 16 10	100·0	7 18 0	100·0	6 19 0	100·0

TABLE V.—*List of Gas-Works Operating the "Direct" Process, 1910 to 1920.*

Works.	"Direct" Process Adopted.	Total Make of Sulphate of Ammonia, 1919.	Sulphate of Ammonia Recovered per Ton of Coal.		Remarks.
			1915.	1919.	
		Tons.			
A	1913	72	28	19½	
B	1914	9	24¾	9	
C	1914	36	20	13½	
D	1914	8½	19½	22	
E	1913	99	18½	20½	Backward system, with downward flow of gases. "Neutralizing-pipe" is fixed, but has not been used. Cyanide extraction is in regular operation.
F	1914	12	18	17¾	"Neutralizing-pipe."
G	1914	26	17	18	"Neutralizing-pipe." Downward flow of gases through boxes.
H	1911	40	16½	18	
I	1911	—	12½	Replaced	Now replaced by plant of older type.
L	1912	31	—	13½	
M	1916	15	—	24	
N	1914	—	15½	Replaced	By March, 1916, the virgin liquor still had been provided with a pre-heater and saturator, with diversion of the foul gases to separate purifier. By 1917, the direct plant was finally abandoned. Recovery of sulphate of ammonia figure is now 24 lbs.
O	1914	—	—	Idle	No returns. Plant idle in 1919.
P	1914	24	27	19½*	*Four years' average. Virgin liquor still too small.
Q	1910	18	—	—	No returns.
R	1915	24	6	13½	Plant replaced 1920 by one of older type.
S†	—	—	—	—	†Exclude from total. Plant is of special type. No returns.
T	1914	8	—	22½	"Neutralizing-pipe."
U	1915	—	15	Abandoned	Plant discarded during the war. It never paid. Liquor is now run to waste.
V	1911	—	14	,,	Plant idle since 1917. Now abandoned.
W	1910	—	—	,,	Plant idle since 1916. Now abandoned.
X	1914	—	—	,,	Plant idle. Now abandoned.
Y‡	—	—	—	—	‡Excluded from total. Plant is of special type. No returns.
Z	1913	17	—	12	The recovery figure during the past few months is 16 to 18 lbs.
Z'	1918	16	—	17	
Z''	1914	9	—	18½	No returns.
Z'''	1914	6	22	18	
25	Average	25	18	17½	Of 26 plants, three have now been replaced, five are idle or abandoned.

The process described in the fifty-fifth annual report, by which a sulphate of ammonia was manufactured with the aid of nitre-cake, from a bye-product in the manufacture of high explosives, was discontinued owing to the altered position now existing having resulted in the adequate supply of nitre-cake being no longer available.

The increasing prices for coal turn thought to other forms of available fuel—such as oil and peat. Though the latter continued to be used successfully in gas-producers for generating power, no further progress is to be reported in the direction of the recovery of ammonia or other bye-products from this widely distributed material.

ACCIDENTS IN GAS AND BYE-PRODUCTS WORKS.

NOTES ON THE ORGANIZATION OF FIRST-AID TREATMENT.

By HAROLD J. HAILSTONE, of Rochdale.

DURING recent years more and more attention has rightly been given to the conditions under which our workers perform their various functions; and one important feature of the developments which have come about is the care devoted to the prevention of accidents. Much has been said and written under this head; and "Safety First" campaigns have been inaugurated in most industries, both at home and in America. The value of such movements in conserving life and limb cannot be exaggerated; and no arguments are necessary here to emphasize the vital importance of this work. Most large business organizations have realized fully that their responsibility does not end simply in preventive measures, but that some provision is advisable to enable accidents to be tended with the minimum of delay and some elementary form of treatment to be given pending the arrival of, or visit to, the works' medical officer. This necessary provision soon indicates its value in the reduction of loss of time and possibly of compensation claims, should accidents subsequently take a more serious turn.

The Home Office instructions issued from time to time have done much to minimize working risks in all the industries of the nation; but there must always exist conditions peculiar to individual works which can only be appreciated by the staff and operatives of the particular works. It is certainly the responsibility of the management to arrange that due attention is drawn to the risks when working their plant and processes; and this is done in many ways—by verbal warnings augmented by instruction sheets and notices. Naturally, the size of the undertaking and the nature and range of the manufactures will largely determine the degree of thoroughness of the policy in operation, which can be formulated only by the works' official responsible for it.

When the preventive aspect of the question has been sufficiently developed by suitable mechanical and other devices, coupled with sound individual and collective instruction of the workers, attention should be turned to treatment. As it is only in the largest undertakings that a resident nurse or doctor is practicable, treatment in the majority of works will be restricted to the rendering of first aid.

FIRST AID.

An elementary knowledge of this work should be possessed nowadays by almost all grades of labour and executive. Such training as is given under the auspices of the St. John Ambulance Association (with its numerous branches over the whole country) equips its students with a sound working knowledge whereby the pupil is enabled to afford skilled assistance in cases of accident and sudden illness, until a doctor's aid can be obtained. The whole subject is dealt with in a comprehensive manner, and serves as a basis for a more detailed study of the special cases likely to be encountered on gas and bye-product works. The organization of this work is of great interest; and individuals on the clerical and administrative staff, or from the works, can always be found who will take an active pleasure in the subject—particularly if encouraged. Such a body of men must be selected with care, as it is important for the various shifts and different departments of the works to be represented, so that there may always be one or more men available during the whole time any portion of the manufacture is in progress.

A centrally situated room, where cases may be treated, and an ample stock of ambulance requisites maintained, is advantageous, and may be regarded as a headquarters for the activity. Such a room should be warm, well lighted, and well ventilated. A couch, a small table, and chairs, are practically the only furniture required; while suitable shelves, cupboards, and one or more sinks well supplied with clean hot and cold water completes the list of fittings. The usual stores of bandages, lint, oxygen, &c. should be available, and all apparatus deemed necessary—*e.g.*, scissors, forceps, splints—kept in definite places and always at hand. The stock of disinfectants, emetics, antidotes, &c., must be clearly labelled (with full directions in large type), and kept in specified places on the shelves. Scrupulous cleanliness and order are necessary, and must be obtained at all costs.

Details of all the cases treated—no matter how trivial they may appear—should be entered on a suitable record, giving date, name, injury, treatment, materials used, and name of attendant. Such a record is likely to prove useful later on in connection with compensation claims, and will throw useful light on the risks attending certain sections of the manufacture.

Suitable notices and directions for treating various cases may well be fixed in the first-aid room; and a book of reference should

be available. Any new ideas should be discussed at the meetings of the group of ambulance workers; and instruction should be given periodically by a qualified member or medical man. Discussions may be held on equipment and the treatment of actual or possible accidents—special attention being given to the plant or processes in operation involving extra danger. Special duties may then be relegated to selected individuals, and the nucleus of an efficient ambulance service formed. If the works cover a large area, the central equipment must be augmented by portable sets or emergency cupboards fixed at convenient points throughout the works—these cupboards to contain any particular requirements of the adjacent plant such as ropes, respirators, special dressings, and antidotes. A pre-arranged system of signals or warnings may be necessary; and notices should be posted where advisable stating what is to be done in the event of a mishap. By this means serious developments following an accident can be reduced to a minimum, and further complications prevented.

Accidents—Mechanical and Otherwise.

For the purpose of this short article, accidents may be divided roughly under two general headings—mechanical and otherwise. The former include fractures, dislocations, cuts, &c., and require for treatment a knowledge of the portion of first aid dealing with splint application, transport, and bandaging. The occurrence of such accidents will be more likely in a works equipped with machinery (conveyors, crushers, hoists, &c.), though casual accidents may happen not connected with machinery, such as falls from scaffolding.

The other accidents met with are burns, poisoning (by chemicals or by gas), suffocation, &c. This type of accident is perhaps more frequently met with in the gas and bye-product industries; and it is advisable to study the aspect more thoroughly. The great danger of burns and scalds (if extensive) caused by steam, corrosive acid or alkali, hot tar or pitch, is the shock to the system, which must be minimized by prompt covering with a sheet of lint smeared with vaseline, picric acid, or special burn dressing. Acid burns require treatment with a tepid solution of bicarbonate of soda, while alkali burns necessitate weak acetic acid.

Poisoning may be caused by sulphuric acid, caustic soda, carbolic acid, tar oils, &c.; the necessary treatment being the administration of an antidote and demulcent drinks.

Gaseous poisoning by sulphuretted hydrogen, ammonia, benzene, coal, water, or producer gas (carbon monoxide) is usually caused by the escape of such gases or vapours in a confined atmosphere, such as an engine-room, still room, still, tank, or flue. The importance of adequate rescue appliances is obvious and cannot be overrated. It is extremely advisable for notices giving particulars of the symptoms, the treatment, and the whereabouts of the nearest rescue apparatus to be placed in prominent positions about the various plants. Workmen should be conversant with methods of artificial respiration and the use of oxygen in these cases.

In conclusion, while the writer realizes the unfortunate fact that no amount of precaution seems entirely to eradicate mishaps, it cannot be denied that much can still be done along the lines indicated in order to reduce such risks, and ensure that all accidents are tended promptly and efficiently until the injured workmen is in the doctor's hands.

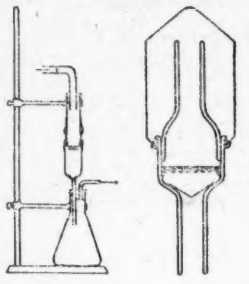
Preventing Depreciation.

Dealing with factors governing depreciation, Mr. C. E. Reese, of Springfield (Ill.), in the pages of the American "Gas Age," says that retorts or ovens should never be allowed to cool-off without coke or some wall-supporting substance to hold the silica blocks in place until the heat is brought-up again. This is specially true with horizontal sectional silica retorts. The life of gasholders depends, among other things, upon whether or not the plant recovers ammonia. He cites the case of a small gas plant in connection with which the unaccounted-for gas increased from 15 to 40 p.ct. within two years. It was found that 25 p.ct. of the leakage was due to the porous condition of the holder. Upon examination of the inside of the holder, it was found to be very thin; whereas from the outside it appeared to be in good condition, because it was well painted. The ammonia was not being removed, but passed on through the purifying system; and the holder water gradually became strong ammoniacal liquor, and ate up the steel tank. It occasionally happens in laying gas-mains that it is practically impossible to keep the water from coming in contact with the material in the joint; and if the joint is made of cement, and becomes wet before it has thoroughly dried and set, it will be weakened. A combination joint of cement, oakum, and sulphur, or just cement and sulphur, can be used to advantage under these conditions. The cement joint is made-up as usual, except that the last ½-inch of the depth is poured full of molten sulphur. The sulphur hardens quickly, and excludes the water, thus protecting the cement until it has time to dry and harden.

We have received from the Secretary of the Society of British Gas Industries (Mr. Arthur L. Griffith) a copy of the rules and list of members and officers. The President for 1920-21 is Sir Arthur Duckham, K.C.B., M.Inst.C.E.; the Chairman of the Council being Mr. Cyril G. Davis, M.Inst.Mech.E., and the Vice-Chairman Mr. Frederick G. Cockey.

DETERMINATION OF TAR IN GAS.

Some time ago, Messrs. C. H. Stone and N. F. Prince were instructed by the Rochester (N.Y.) Gas and Electric Corporation to make a survey of the tar situation at the gas-works. The investigation required tests on the inlet and outlet of the "P. & A." extractor, the inlet and outlet of the water-gas boxes taken as a series, the inlet and outlet of the coal-gas boxes taken as a series, the inlet to the holder, and the gas on its way to the city. The tests were to occupy several days, and be made under varying conditions of gas manufacture. In an account of the work appearing in the "Gas Age," Messrs. Stone and Prince say that consistent and reliable results were obtained with apparatus devised by them which they describe as follows: The gas enters a wide glass tube, and passes from this into a Gooch crucible with a fairly thick layer of asbestos fibre well packed on the bottom. The crucible is united to the glass tube by a wide rubber band which also serves to some extent as an insulator. The crucible, at the lower end, fits into a rubber connector on a glass tube which passes through one of the holes in the stopper of an Erlenmeyer flask. Through the other hole, a tube leads the gas to the meter. Just below the crucible, is a piece of filter-paper loosely placed over the exit to the flask. This simply serves as an indicator to prove that all tar is being removed from the crucible. The apparatus is supported on a ring-stand. The crucible is easily and quickly separated from its rubber connector, and is the only part of the apparatus to be weighed.



Apparatus used In Tar Survey. Proposed Apparatus.

In making a determination, the procedure was as follows: Purified gas, dried through calcium chloride, was passed through the crucible for 1½ hours. The crucible was then put in a desiccator, and weighed after a few minutes. It was then connected to the remainder of the apparatus, and a quantity of gas varying with the location of the test was passed through. The rate also depended on the amount of tar present, and ranged from 2 to 6 ft. per hour. The apparatus was then returned to the laboratory, and dry purified gas again passed through it—this time for two hours. To prove that all water had been removed, the exit gas was bubbled through benzol containing a lump of copper sulphate. It was found by this test, after half-an-hour, that water was still in the exit gas; but after two hours, all traces had been removed. The crucible was then weighed as before; the difference between the two weights giving the weight of tar in the volume of gas tested. This volume, as has been said, varied with the amount of tar in the gas, running from 3 ft. on the inlet to the "P. & A." extractor to 30 ft. on the gas going to the city. The latter amount gave about 1 milligram of tar, and the former about 100 milligrams. The use of gas instead of air for drying the crucible prevents the volatilization of the lighter elements of the tar. As a precaution, to prevent the test-pipes from closing, a stiff wire was passed in and out several times, prior to each test, thereby making an unobstructed passage for the gas. While opening-up these outlets, there was only one instance where the tar had collected in such quantity as to make this necessary.

A less cumbersome apparatus was afterwards devised by Mr. M. G. Eilers. In this, the gas enters through the tube at the top, which is fitted by a ground joint to the bottom tube. A wire serves to suspend the whole while weighing; and the tar is removed by a layer of asbestos, as in the method already described. The bottom tube can be connected direct to the meter, or it can be run into an intermediate flask if desired.

With the apparatus described, good results have been obtained and an illustration of one day's results is given; the tar being expressed in grains per 100 c.ft. of saturated water gas at 60° Fahr. and 30 in. pressure. At the inlet to the "P. & A.," the amount was 24·1 grains; and at the outlet, 1·7 grains. At the inlet to the water-gas boxes, 1·5 grains; and at the outlet, 0·5 grain. In the coal-gas plant, the results were: Inlet to coal-gas boxes, 0·4 grain; outlet, 0·3 grain; inlet to holder, 0·2 grain; and outlet to city, 0·03 grain. These figures are interesting as showing the efficiency of the "P. & A." extractor, and the amount of tar deposited in the boxes.

The authors believe they have devised an apparatus which can be put in the hands of a man without great technical training, and permit the determination with accuracy and ease of the amount of tar at any point in the system.

Temporary Increase of Charges Act.—Orders have been made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act authorizing increases in the maximum charge for gas by the Festiniog Urban District Council from 6s. to 8s. per 1000 c.ft., by the Mountain Ash Urban District Council from 6s. to 6s. 9d. per 1000 c.ft.; and by the Newbury Corporation from 5s. 6d. to 6s. 6d. per 1000 c.ft. The Ministry have also received applications for Orders from the Lincoln, Neath, and Todmorden Town Councils.

CITY AND GUILDS OF LONDON EXAMINATIONS.

List of Successful Candidates in "Gas Engineering," "Gas Supply," and "Gas-Fitting."

CONFORMABLY with the practice before the war, the pass-lists for the recent examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting" have been sent by the Department of Technology of the City and Guilds of London Institute to the Institution of Gas Engineers; and they have been forwarded to us for publication by Mr. Walter T. Dunn, the Secretary. The questions set in the different examinations will be found in the "JOURNAL" for April 27 [p. 211], May 4 [p. 271], and May 11 [p. 337].

GAS ENGINEERING.

FINAL GRADE.

First Class.

Alexander, Duncan
Appleyard, Norman G.
Battersby, Walter H.
Blackmore, John P.
Booth, Alfred L.
Bradshaw, Richard J.
Brown, Charles J. P.
Carmichael, Stanley
Chadder, William J.
Clarke, Bernard
Collinge, Arthur K.
Collyer, John C.
Curtis, Harry
Dean, Swinton B.
Dupont, Fernand
Edwards, Alfred D.
Filmer, Duncan H.
Gaskill, Malcolm S.
Glover, Thomas B.
Goldsmith, James H.
Greaves, John
Greenwood, Leonard
Gretton, Richard A.
Griffiths, Geoffrey
Hawthorn, Sidney K.
Hickling, Fred. W.
Hislop, Lawrence
Ingham, Charles R.
Jones, William T.
Lamond, Alex. W.
Lees, Herbert D.
Little, John A. G.
Macfarlane, Gilbert R.
Mortimer, Thomas R.
Nash, Edwin Charles
Nicholls, Charles H.
Owles, Archibald B.
Paterson, Walter M.
Pepin, Stuart Philip
Pilditch, Cleverton L.
Plant, Arthur Y.
Porter, John Richard
Shadbolt, W. R. S.
Stephenson, W. E.
Summerson, Roy
Symons, Fredk. John
Thompson, Geo. E.
Varley, Willie
Vollans, Benjamin V.
Walker, Roland
Waterfield, W. J. R.
Weaver, Leonard J.

FINAL GRADE.

Second Class.

Baker, William J.
Bateman, Charles
Beesley, Horace G.
Bibby, Eric
Broadbridge, H. G.
Buckley, John W.
Byers, Thomas
Carrington, James H.
Carson, John
Connor, Frederick W.
Cook, Geoffrey N.
Crowther, George B.
Cutler, George A.
Doherty, Edward J.
Eve, Edgar William
Farmer, John A.
Harrison, John Allen
Hopkins, Frank John
Kelly, William Henry
Knapp, Stanley R.
Laing, Robert L.
Laycock, William
Lee, Leonard
Lister, Horace
Mepham, Leonard W.
Michelsen, Charles C.
Morley, Arthur M.
Moss, Lionel Austin
Preston, Joe Bray
Radnall, Edward W.
Reed, Francis George
Richardson, C.W.M.
Rowley, Arthur
Shaw, William H.
Simpson, Albert E.
Smith, Joseph Frank
Smith, Wm. N. H.
Spencer, Herbert
Stamforth, Fred
Stephens, Henry
Stubbs, George R.
Taylor, Charles L.
Taylor, Thomas E.
Thompson, Frank P.
Thorpe, Benjamin
Turner, Clifford
Turner, Dick
Waggett, George
Waterman, W. S.
Watkins, William H.
Watson, Gordon H.
Webb, Philip Henry
Webber, Harry
Williams, Tom H.

GRADE I.

First Class.

Gray, Robert
Hall, James

GRADE I.

Second Class.

Edington, William
Sturrock, Robert

GAS SUPPLY.

FINAL GRADE.

First Class.

Ashwood, Francis W.
Baker, William J.
Beesley, Horace G.
Broomhall, E. F.
Carnay, William P.
Chisholm, W. W.
Church, Arthur A.
Cooper, Albert G.
Creak, Henry Philip
Dean, Swinton B.
Escreet, Hubert J.
Evans, David W.
Flavell, Arthur
Glass, Henry Frost
Greenacre, John H.
Gretton, Richard A.
Griffiths, Geoffrey
Hallam, William T.
Harris, William John
Hickling, Fred. W.
Hodgson, John W.
Holroyd, John W.
Hopkins, Frank John
Joyce, John George
Laing, Robt. Laurence
Malyn, Leonard
Marsh, George
Pilditch, Cleverton L.
Randall, Frank Cecil
Reed, William Henry
Rhodes, Herbert
Smith, Sydney
Stephens, Henry
Williams, Tom H.
Winch, Egbert H.
Wood, Walter Scott
Woods, Alfred C.
Wren, Harry Wm.

FINAL GRADE.

Second Class.

Appleyard, N. G.
Brown, Harry C.
Cole, Herbert K.
Cook, Geoffrey N.
Crathorn, Albert
Crowther, George B.
Dupont, Fernand
North, George E. V.
Paradice, Edward H.
Ridgewell, Charles
Smith, Wm. N. H.
Thomas, Arthur J. O.

GRADE I.

First Class.

Gray, Robert
Hall, James

GAS FITTING.

FINAL GRADE.

First Class.

Ashwood, Francis W.
Clare, John M'Millan
Dieterichs, William
Edwards, Sydney H.
Hollings, George
Joyce, John George
M'Call, William
Moden, Robert C.
Penny, Charles
Pinn, Stanley
Stanley, Horace R.
Taylor, Gilbert A.

FINAL GRADE.

Second Class.

Andrews, Walter
Ashley, James H.
Ashwood, Rowland S.
Jackson, Harry C.
Meek, Harry
Morton, Sydney H.
Paradice, Edward H.
Pilkington, Joseph
Ridgewell, Charles
Stokes, John Charles
Tetlow, Edward
Wallace, Eric
Williams, Wilfred E.

GRADE I.

Cooke, William L.

GRADE II.

Anderson, Thomas W.
Ansell, William E.
Bayne, Alfred
Best, Albert Richard
Bishop, Leslie W. A.
Bradley, William
Brommage, Arthur
Brough, Wilfred
Burnell, Albert E.
Cairns, Arthur Joseph
Davies, Thomas A.
Dunn, Lewis A. J.
Edwards, Sidney F.
Endicott, Richard J.
Fry, William Thomas
Furnell, William
Gill, Percival W.
Hazel, Leslie Robert
Hickman, W. J. S.
Hobdell, John G.
Horrod, Frederick G.
Jones, Thomas
Law, Charles Victor
Lloyd, Leonard L.
Murrin, Willie W.
Muston, Frank E.
Neely, William G.
Pelling, Edgar
Pells, William E.
Phœnix, Robert R.
Robinson, Charles A.
Seaward, Sidney
Sergent, Robert
Sherriff, Tom
Smith, Victor Charles
Smith, William
Standage, W. G. E.
Tolman, William T.
Trevitt, Robert
Turner, Thomas H.
Turpin, Harold D.
Tutt, George Thomas
Tyrrell, Albert E.
Wall, Thomas
Williams, Albert E. V.
Williams, Thomas G.
White, Frederick H.

Candidates who passed in One Section Only of Grade II.

Written Examination.

Brown, Charles
Godwin, Percy W.
Green, Reginald
Hancock, Herbert
Stapley, Percy W.
Suckling, John R.
Ware, Arthur H.

Practical Examination.

Atkinson, Sidney
Battishill, Harry W.
Bellamy, Chas. T. G.
Chapman, L. W.
Clarke, Frederick H.
Cook, Frank H.
Evans, James E.
Forrest, Harry
Freeman, Fredk. J.
George, Henry J.
Hunt, Charles John
Morris, Leonard G.
Slater, John
Strutton, Clifford
Thornhill, George E.

PURIFYING PRODUCER GAS.

A detailed description of the Freytag-Metzler system of purifying blast-furnace and producer gas has been given by Signor Bruno Schapira in the columns of "L'Industria." In this method, the water-content of the gas is not removed during the process of purification.

Abstracting the description, the "Technical Review" says the apparatus used comprises a filter body or chamber which is rotated slowly and continuously by a worm gear driven by a motor. The casing of the filter is roughly round-shaped, the cross-section being rectangular. This casing is divided by partitions into several compartments. Concentrically to the filter proper is a fan, the blades of which are so designed as to leave a fair amount of clearance between the fan and the filter. The stuffing-box or gland of the fan-shaft and the nave of the filter body are exposed to the action of the filtering liquid, and thus make the connection between the two gas-tight. By raising a side cover, the fan rotor and blading can be lifted-out separately, or the fan body and the filter body together. In the smaller apparatus, the bearings are mounted directly on the lateral cover and on the gas-inlet piping; while in the larger sizes the bearings are mounted on supports carried on special foundation plates. The scouring device is secured to the top cover or casing.

The gas is admitted centrally—*i.e.*, through the shaft of the apparatus—while the gas-delivery pipe is at the front part of the filter. At the side of the apparatus is a tank, whence the filtering liquid is fed into the clearing or settling tank, where the filtering material (solid), and the dust, &c., are separated from the filtering oil. The casing of the apparatus is divided by partitions into a gas-delivery chamber, a scouring chamber, and a chamber for containing the solid filtering substance. According to the size of the apparatus used, the solid filtering material is fed in either by hand or automatically. In the latter case, a container rotated by the worm gear described above, and provided with pockets, takes the material from the filling tank and charges it into the purifier. A valve, controlled from the outside by a hand-lever, and placed inside the casing at the bottom, permits of the continuous evacuation of the filtering material, and of controlling the quantity that is introduced.

The gradual movement of the filter body can be regulated within wide limits; the highest speed being four times the minimum speed, according to the quantity of impurities which the gas contains. A measuring vessel records the pressure inside the filter, and so controls the speed. Suitable openings, fitted with covers, are provided for thoroughly cleaning the apparatus. The filtering medium used in this apparatus is either peat or fibrous lignite; and the filtering liquid for blast-furnace gas is generally tar oil, and for producer gas hot tar. The results given by this type of purifier are said to be extremely satisfactory.

THE BESNARD RETORT DISCHARGER.

[From a Paper read before the Congress of the Société Technique du Gaz.]

The machine of his invention, described by M. Ch. Besnard under the name of "Déluteuse," is a mechanically operated rake, for which great simplicity and strength are claimed, as well as small cost and working space.

Fig. 1.—Introduction of the Rake into the Retort.

Fig. 2.—Rake in the Discharging Position.

The apparatus consists of a rake or scraper A, mounted on the end of a horizontal iron tube N, by means of a strong hinge O of special construction, allowing the rake to be extended in the horizontal position or brought down at right angles by its own weight, and by the operation of the carrier tube. The other end of the tube is provided with a threaded rod M, on which is screwed a double cross-piece C, affording four handles by which the rod is operated. A second tube J, of suitable size, serves as a sheath for the first, which moves freely in it, allowing part of the screw-threaded rod that carries the hand-piece to project. The outside tube has at each end a sleeve K. The hinge of the rake is of square form, and so made that it is brought to a stop solidly against the end sleeve of the outside tube when the inner rod is operated by the hand-piece C. The blocking of the hinge is made more effective by the fact that the face of the portion opposite the sleeve projects beyond the other portion, and bears directly on the end of the tube.

The mode of operating the rake is as follows: The carrier tube M having been accommodated in the outside tube J, the hand-piece C is screwed on to the threaded rod of the inner tube. The hand-piece is bolted to an iron plate L, free to turn on the outside tube to the rear of the sleeve; so that by the operation of the hand-piece the inner tube can be advanced or drawn-back in the outer tube—thus locking or unlocking the hinge in its operative position. On the end of the threaded rod in the inner tube is a double handle D, which serves for reversing the tube so as to bring the rake into the upper position after the removal of the charge and for keeping it there while it is being inserted into the retort.

The machine may be employed on any system of mechanical charging—the discharging unit itself weighing only about 60 kilos.—or it may be mounted on a separate carriage or attached to an overhead support.

Fig. 3 shows it fitted to one of the sides of the travelling platform P, which carries the charging unit. A pair of steel cables E (fig. 4) pass over pulleys, and join at one end in a triple block, while at the other they support horizontally at its ends a length of channel-iron. Tubes F at the ends of this bar afford necessary stability. Directly below, two other lengths of channel-iron—arranged back to back with enough space between them for the passage of the Galle chain—form a runway for the carriage supporting the rake. This runway is connected to the upper rail by rollers, the links of which pass into the grooves made in the back of the channel-iron—thus allowing the lower rail to be brought up to the head of the retort, to be supported when in operation, and then to be withdrawn as shown in fig. 4. The tube enclosing the rake is supported on this runway on two carriages G, fitted with four rollers. The rear carriage is rigidly connected with a Galle chain engaging with two pinions placed at the ends of the double rail, and which, when it is operated by the hand-wheel B, gives the carriage the movement necessary to insert the rake to the back of the retort. The front carriage serves only as a support for the rake during insertion. Then, when the rake has been brought into its lowered position behind the coke, this movable support is lowered and the rake rests its whole weight upon the coke. The travel of the carriage is limited to about one-quarter of the length of the runway. After the discharge of the coke by the operation of the lever H, the rake is received at the mouth of the retort by the support of the front carriage, which comes into position when the rake has been set straight.

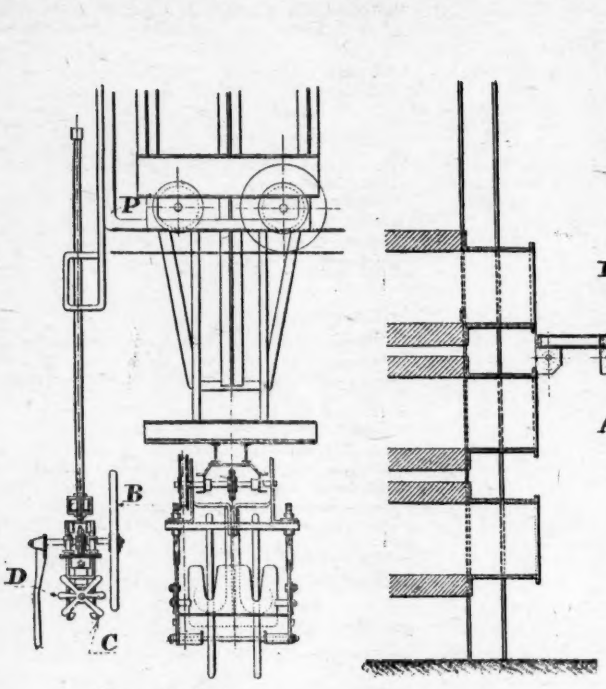


Fig. 3.—Back View.

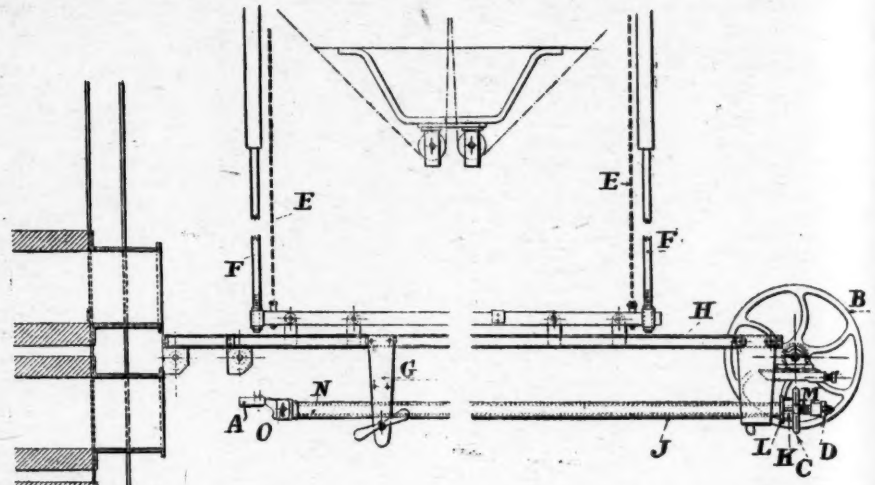


Fig. 4.—Front View.

The machine has been in use for some nine months on a bench of four retorts, and has required about six to seven minutes for the discharge of all four. The rake and its tube have proved quite unaffected by the heat, and have required practically no attention, although used in unfavourable conditions owing to the bad state of the retorts. The weight of the whole addition to the charging machine is 400 kilos.

PROMOTER ACTION IN CATALYSIS.

From a lengthy discussion of the subject of promoter action in catalysis, by Messrs. R. N. Pease and H. S. Taylor, which has appeared in the United States "Journal of Physical Chemistry," the two following sections have been taken.

The Water-Gas Reaction.

Promoter action has been studied in connection with the water-gas reaction carried out catalytically at low temperatures for the removal of carbon monoxide from hydrogen. The reaction involved is:

$$CO + H_2O \rightleftharpoons CO_2 + H_2.$$

The following table will give an idea of the effect of adding various promoters to the iron-oxide catalyst. The results are for a water gas containing 25 p.ct. of CO and 75 p.ct. of H_2; steam having been introduced to make the steam-H_2 ratio 2 : 1. The term "space velocity" is used to express the ratio of c.c. of gas per

Catalyst.	(1)	(2)	(3)	(4)
Gas flow—litre-hour . . .	3·1	21·5	8	16
Apparent volume, catalyst—c.c.	5	3	2	3
Space velocity	620	7000	4000	5300
P.ct. of CO_2 in effluent . .	20·2	24·5	25·2	25·0

hour to c.c. of the apparent volume of the catalyst, and may be taken, together with the quantity of carbon monoxide converted, as a measure of the activity of the catalyst.

The following catalysts were employed after ignition:

(1) Spathic iron ore ignited at 600° C.
(2) 85-Fe nitrate and 15-Cr nitrate.
(3) 40-Fe nitrate, 5-Cr nitrate, and 5-Ni nitrate.
(4) 194-Fe nitrate, 5-$(NH_4)_2Cr_2O_7$, and 1-Thorium nitrate.

All tests were made at 440—450° C.

With iron oxide alone, the oxidation was incomplete at the relatively small space velocity of 620. Addition of approximately 3 p.ct. of chromic oxide and 0·5 p.ct. of thorium oxide resulted in the complete conversion at a space velocity of 5300—over eight times as great.

In the results given above, the comparatively great effect produced by such small quantities of promoters becomes somewhat more explicable if one takes into account the fact that the catalysts were prepared by evaporation of a solution of the soluble salts of the metals and subsequent ignition. In the evaporation, the promoters, being present in small quantities, will only begin to deposit towards the end of the evaporation, while the iron oxide begins to come down fairly early as a flocculent precipitate. This forms a pasty mass, on the surface of which it is to be expected that the promoter salts will be slowly deposited. The mass is stirred during the evaporation. The promoter will, therefore, presumably be largely concentrated on the surface of the iron oxide finally obtained, where the gas reaction is subsequently to take place. An experimental test of the validity of this view-point would not be without interest.

THE INCANDESCENT MANTLE.

Auer von Welsbach has found that additions of small quantities of ceria to the thoria used as a refractory in incandescent mantles considerably increased the light emissivity; the latter reaching a maximum for the mixture of 99·1 p.ct. of thoria and 0·9 p.ct. of ceria.

If one may consider that the thoria acts in part as a catalyst for the oxidation of the gas, then it would not appear improbable that the ceria played the *rôle* of a promoter. It has usually been assumed that the thoria acts simply as a radiator, and that the ceria is possibly an oxygen carrier. From the point of view of catalysis, we are dealing here with a case of surface combustion. The mantle is a catalyst for the oxidation of illuminating gas. In the light of this, the increased emissivity of a mantle containing ceria is due in part at least to more rapid combustion, which results in the mantle attaining a higher temperature. In general, ceria appears to be especially useful as a promoter in oxidation reactions. A direct determination of the catalytic activity in this reaction of thoria, alone and containing small quantities of ceria, would be of interest. Discovery of a maximum in catalytic activity corresponding to the maximum in light production would go a long way toward explaining what is at present a very puzzling phenomenon.

Profits from Appliance Sales.

In a paper which he read before the Southern Gas Association of the United States, Mr. J. A. Forney declared that the old idea of gas companies giving appliances away or selling them at cost price has done the gas industry more harm than anything else he knows of. The customers do not want cheap merchandise, nor do they want good merchandise cheap. They wish for the best, and are perfectly willing to pay the price. There is, he says, no good sound business reason that will excuse a man for allowing his gas sales to stand a loss, resulting from the sale of appliances. In his own town of Charlotte, until a short time ago gas appliances were sold at the actual cost of the goods; and no charge was made for connecting ranges or for small piping jobs. It was, however, decided to sell the appliances at a profit, and make the new business department stand alone. After finding what it was costing them to do business, and adding this to the cost of the appliance, *plus* a fair profit, the cost of installation, and salesman's commission, it was found that most of the appliances were advanced 90 to 100 p.ct. over the old sale price. Then a start was made with charging for all piping work, and for labour where no material was required. A certain amount of objection was raised to charges for piping; but he has never heard any serious complaint of the increase in the prices of appliances; and the result has been that the dealers, as well as the gas undertaking, have sold greater numbers and better appliances, while the consumers have been more satisfied. He suggests that it would be desirable for gas administrators to meet and discuss the prices charged for appliances, so as to adopt some basis for a uniform sale price. In this way, when consumers moved from one town to another, they would find the charges for a given appliance or piping work to be in keeping with the scale adopted by other companies.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Increased Cost of Living.

SIR,—Enclosed is a leaflet which I prepared for insertion in our workmen's pay-bags.

The quotation is taken from an article by Mr. Murray, M.P., in the "Economic Supplement" of "Land and Water" dated April 8, 1920.

D. H. HELPS,
Engineer and Manager.

Reading Gas Company,
July 29, 1920.

[ENCLOSURE.]

THE INCREASED COST OF LIVING.

It is Useless to Grumble at the High Price of Goods.

If each man does his best in his own particular job, the cost of living will soon be reduced. That is the only way to avoid the trouble that must come, sooner or later, with high wages, short working hours, and low production.

> "There are some things so true and important that the saying of them can never be really out of place or season. 'To live you must work' is one of them. No nation can live well unless it works hard. A nation's income is its output. From no source but this can it satisfy its needs and pay its way. Example counts enormously. Those who first break the spell for themselves can help the slower and the weaker, for energy is infectious."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Gas and Water Provisional Orders Bill was read the third time, with the amendments, and passed.

The Brighton and Hove Gas Bill was read the third time, with the amendments, and passed.

HOUSE OF COMMONS.

Progress of Bills.

The Uxbridge and Wycombe District Gas Bill was read a second time, committed, and reported with amendments.

The South Suburban Gas Bill was read a third time, and passed, with amendments.

Co-Partnership and Industrial Unrest.

Among the notices of motion for which no day has been fixed, is one by Sir Fortescue Flannery—"That this House would favourably receive proposals for legislation to facilitate co-partnership between employer and employed as a means of allaying industrial unrest and increasing production throughout the Empire."

GAS REGULATION BILL.

Report Stage and Third Reading in the House of Lords.

In the House of Lords last Thursday, the amendments in Committee to the Gas Regulation Bill [*ante*, p. 193] were reported, according to order.

Viscount CHURCHILL said certain amendments were withdrawn in Committee in order that they should receive further consideration by the Board of Trade. He had put down an amendment, which he hoped would be accepted. If not, he would like to know why the Board of Trade declined to undertake the discretionary powers which it was proposed by the amendment to confer upon them. The amendment was, after subsection 4 of clause 1, to insert the following new sub-section:

> (5) If in any case the alteration, adjustment, or replacement of the burners in a consumer's appliances does not secure that the gas can be burned with safety and efficiency, the Board of Trade may, on the application of the consumer, if they think fit, require that the undertakers shall at their own expense, and within such period as the Board of Trade may prescribe, alter or enlarge the service-pipes and meters of such consumer.

The MARQUESS OF LONDONDERRY said the Board of Trade were of opinion that the proposal would impose upon undertakers a liability which it was impossible to define. This was the main difficulty; and in the opinion of the Board, it must lead to endless disputes. The question whether a consumer's service-pipes were or were not adequate to deliver a supply of a particular quality of gas was one which did not admit of precise determination. He had promised to consider this matter carefully with the Board of Trade, to see if it was possible for them to make some modification in the attitude which he had taken up on the second reading, and also in the Committee stage. The question had since been discussed fully at the Board of Trade with a deputation representing the Association of Local Authorities not Owning Gas Undertakings and the Railway Companies' Association. The deputation's final proposal was that the Board of Trade should take power to call upon undertakers to replace service-pipes where they appeared to be inadequate to carry a sufficient supply of gas of the calorific value which the undertakers proposed to supply; and this

virtually was the effect of the amendment. The cases to meet which the suggested provision was designed were chiefly those of railway companies, and, secondly, the poorer districts in towns where the domestic pipes might be of small size. The view of the Board was that these cases could, and should, be met by provisions regarding pressure inserted in the Order relating to the undertaking. It was only reasonable to expect that the gas companies would make a point of giving so much pressure as would enable the amount of gas which the consumer required for consumption in his house go through the meter. A vague general obligation to alter meters and pipes might very well deter undertakers from making any effective use of the provisions of the Bill; and he thought the noble Viscount would realize that the main object of these provisions was to give a certain amount of freedom in the production of the best kind of gas, together with the conservation of coal. If they were going to impose on gas undertakers more conditions than were necessary, they would cramp the enlargement of the industry, and deter undertakers from using their ingenuity and inventive powers for the purpose of producing gas at the lowest cost to the consumer, and in the most effective way. With respect to the replacement of meters, this involved very similar considerations; and it was impossible to accept the amendment.

The amendment was by leave withdrawn.

The next amendment, which was agreed to, was to insert the word "in" before "any pipe" in subsection 2 of clause 2, making it read:

> (2) The minimum permissible pressure shall be such pressure in any main, or in any pipe laid between the main and the meter having an internal diameter of 2 in. and upwards, as to balance a column of water not less than 2 in. in height except as may be otherwise provided by the Order relating to any undertaking; and different minima may be specified for different parts of an undertaking, or for gas of different calorific values.

The MARQUESS OF LONDONDERRY said the object was to make clear what was always intended—namely, that the limitation of the size of pipes applied only to pipes between the main and the meter (*i.e.*, service-pipes), and that the prescribed pressure must be maintained in any main, whether the main was more or less than 2 in. in diameter.

Other amendments agreed to had the effect of making provision (*c*) of subsection 2 of clause 10 read as follows:

> (*c*) authorize any local authority which may be authorized to supply gas within their district to supply gas outside the district in any area which is not supplied with gas by any other undertakers or which is within the area of supply of any undertakers whose undertaking has been acquired by such local authority.

Third Reading.

The Bill was read the third time on Friday, with the amendments, passed, and returned to the Commons.

Amendments Agreed to.

In the House of Commons, on Monday, the amendments made by the House of Lords were considered, and agreed to.

LEGAL INTELLIGENCE.

BEXHILL WATER AND GAS ASSESSMENT.

The Bexhill Water and Gas Company, who for the last two years have felt the financial pressure from the continued increase in the working expenses of their two undertakings, at length decided to approach the Rating Authorities of the Unions into which their works and mains extend, and as a preliminary step consulted Mr. W. G. Cooke, A.R.I.B.A., the rating expert.

Estimates of the annual value of the entire concerns were prepared by Mr. Cooke, with whom were associated the Company's Secretary (Mr. W. M. Jesty) and their Resident Engineer, who supported the Company's case before the Assessment Committees.

After prolonged inquiry, the combined decision was a reduction equalling 31¼ p.ct. in the rateable value, which in the special circumstances connected with one of the Unions, represents a relief greater than the figures alone would convey to the mind.

Maidstone Gas Company.

In their report for the year ended June 30 [which is to be submitted to the proprietors at the meeting to-morrow], the Directors refer to the Gas Regulation Bill as holding out prospects of a more adequate return than at present to the shareholders. They go on to say that at the beginning of the past trading year the Company were faced with largely increased costs in coal, labour, and material. To meet these, it was necessary to apply to the Board of Trade in July, 1919, for power to increase the price of gas from 4s. 4d. to 4s. 10d. per 1000 c.ft. The application was granted. The further advance in the price of coal ordered by the Coal Controller on May 12 last, together with two awards of higher wages within the year, necessitate another application to the Board of Trade for power to increase the price of gas. The accounts show that, after providing for all fixed charges, including £2000 depreciation in respect of stoves and fittings, and £1831 for renewal fund, there remains an available balance of £14,059. Under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, the Company are making application to the Board of Trade for permission to pay a dividend for the year of 3¾ p.ct.; and, subject to the approval of the Board, the Directors recommend that a dividend at this rate (less tax) be paid. An interim dividend at the same rate was paid. The total sales of gas exceeded 348 million c.ft., the highest in the history of the Company. The Directors regard this as an increasing recognition of the utility of gas appliances. The approval of the shareholders will be sought to a donation of £250 being given to the fund now being raised for the extension of the West Kent Hospital. The sanction of the Board of Trade to this contribution has been obtained. The Directors note with satisfaction that the Chancellor of the Exchequer has promised to make provision in the Finance Bill for the exemption for three years of statutory companies from the new Corporation Tax.

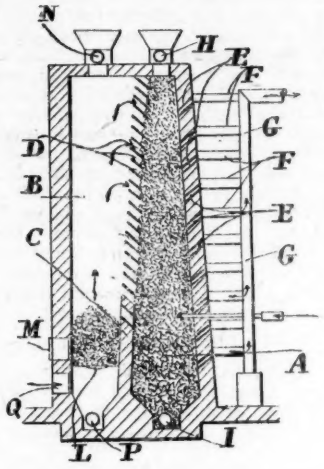
REGISTER OF PATENTS.

Distilling Carbonaceous Material.—No. 145,102.

PERRY, W. P., of Leytonstone, E.

No. 1426; Jan. 20, 1919.

This invention relates to apparatus for distilling peat, shale, coal, wood, or the like, in a chamber in which the material to be distilled is passed from the top to the bottom and the residue removed—the walls of the chamber being provided with openings on opposite sides through which (on one side) hot gas generated in a chamber annexed thereto (or from an external source) is conveyed into the chamber and then through the material to distil it, and then passes with the products of distillation through the openings on the other side into a chamber to be drawn off by a pipe into a condenser. In apparatus of this type the operation has usually been intermittent—that is to say each charge is treated separately; but the object of the present invention is to construct such apparatus so that the distillation can be carried on continuously in the distilling chamber in which the hot gas enters.



Perry's Distillation Plant.

The apparatus shown consists of two chambers—one A being a distilling chamber and the other B a gas generating chamber; the partition C between the two chambers having angled slats, forming ports or passages D for the passage of the gas or vapour from chamber B into chamber A at various heights—the vapour or gas being caused to pass through the material in chamber A and away by outlets E in the wall, and through pipes F to a conduit G and to the usual exhauster, condenser, and scrubber.

The material in chamber A is fed continuously through a valved hopper H; and the resulting coke-residue is taken away continuously by a screw I or conveyor at the base.

The generating chamber B is provided at its lower part with a grate L and door M, on which a fire can be built to generate the necessary gas and vapour for distribution from the chamber B. The fire is kept replenished with fuel falling through a valved hopper N at the top; while the ashes are removed by a screw P at the bottom; air to support combustion being supplied at the inlet Q.

Burning Spent Iron Oxide.—No. 145,366.

CROWTHER, W., of Cheadle, Cheshire.

No. 728; Jan. 9, 1920.

The furnace or kiln consists of a firebrick rectangular erection containing three parallel rows of charging compartments, one above the other—the charging doors being all on the front of the furnace.

The three points claimed to have been accomplished are: (1) Utilizing all waste heat (generated in each compartment by the consumption of the burning charge of spent oxide) in supplying external heat to the charge in the adjacent kiln—thus helping the combustion. (2) Obviating the nuisance usually caused by the extremely light dust formed by the oxide when burned. (3) A material increase in the tonnage burned.

All these effects are secured by the special arrangement of the exit flues from each combustion compartment; and the second effect also, by the method adopted for the isolation and removal of the burnt spent oxide dust. These are:

(A) Arrangement of flues. The charge is put into any one compartment and ignited. The gas evolved escapes by a square outlet hole in the arch, placed near the back, and well to one side of the arch, so that it finds itself in the space between the arch and the compartment immediately above it. It then travels through the space to within about 18 in. of the front of the furnace, round a mid-feather, and then to the back again, on the opposite side of the mid-feather. Thus each burning compartment has the hot gas from the compartment immediately below, travelling from back to front, and back again, just under its bed. The gases from all the kilns contained in one vertical row then enter one and the same vertical flue (one of which exists for each vertical row of compartments), and so pass downward, and under the bed of the corresponding bottom kiln (which otherwise would, of

course, have no hot gases supplying it with heat). Thus far the utilization of the waste heat has been accomplished. All the gases emerging from the back of the various kilns now meet in one common flue, which takes an upward trend, and then passes round the sides of the kiln—thus helping the deposition of dust—before going on to be used in the ordinary way.

(B) Removal of the burnt oxide dust. This is pushed off the shelves at the required time to a receiver at the back of the kiln where a bin receives it. A damper is then pushed in to eliminate any excess of oxygen to the acid plant before the box door is removed and the waste spent oxide withdrawn.

(C) Each shelf is 3 ft. 8 in. wide and 10 ft. 6 in. long, and capable of burning 10 cwt. per shelf in 18 hours, eliminating sulphur in the residue down to as low as 2 p.ct. This exceptionally wide shelf is rendered possible (and also practically unbreakable) by the peculiar construction of the arches and flues; the mid-feathers acting as supports to the beds.

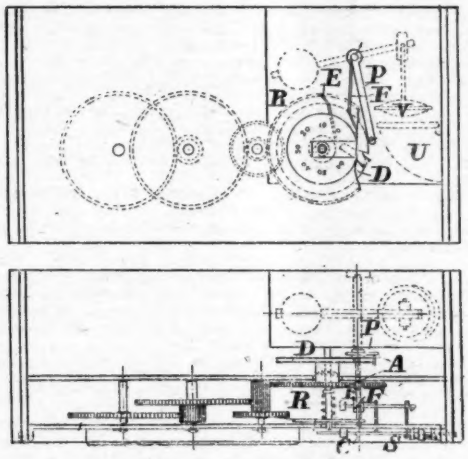
Slot Gas-Meters.—No. 145,105.

ANNINGER, M., of Trieste, Austria.

No. 4274; Feb. 20, 1919.

This invention particularly refers to apparatus wherein varying quantities of gas can be delivered as required by the consumer; the supply of gas being stopped automatically as soon as the predetermined quantity of gas has been consumed.

The apparatus comprises a shaft adapted to be turned by a key for setting the apparatus, and which, on the operation of the clockwork of the meter, is caused to revolve synchronously with one of the wheels of the clockwork, and transmit its motion through a toothed cylinder clutch to a disc provided in combination with, and actuating, the device controlling the valve for shutting-off the supply of gas—the clutch being so constructed as to allow resetting of the apparatus before the whole of the predetermined quantity of gas has been consumed.



Anninger's Slot Gas-Meter.

An elevation of the apparatus and a plan are given. The distributing apparatus is operated by a toothed wheel R, having the same number of teeth and the same diameter as the wheel that actuates the "tens" pointer of the clockwork of the meter. The wheel is mounted on the shaft A so as to be capable of sliding longitudinally along the shaft, together with the toothed cylinder to which it is fixed. This cylinder has ten teeth so made as to engage with the corresponding teeth of another cylinder facing it. This latter cylinder is fixed, together with the disc D and a dial, on the shaft. The disc has a notch in which there is adapted to engage the pin of a crank P that operates the valve for shutting-off the gas.

A dial is provided on the shaft marked with the quantities of gas to be delivered in correspondence with the number of teeth of the cylinders. For instance, in the example shown the movement of one tooth corresponds to the delivery of 10 cb.m. of gas.

The shaft has a square front end adapted to receive a key for turning it. The key hole in the casing through which the key is inserted is normally closed by a bolt C of the lock S so as to prevent unauthorized persons setting the apparatus. Parallel to the bolt and connected to it is a rod ending in a plate having a slightly bent end E, opposite which is another plate F fixed on the prolongation of the axle of the valve V.

When the apparatus is not set, the dial is at zero; the pin is engaged in the notch of the disc D; the valve V is lowered on to the gas pipe U; and the plates E and F are in contact with each other. To operate the apparatus, it is necessary first to open the lock S and shift the bolt C. This operation causes the attached rod to move longitudinally, carrying the plate E with it.

The meter having been set in operation, the wheel R, which is maintained by a spring in a position that keeps the toothed cylinders in engagement with each other, transmits the motion of the clockwork to the disc D and the dial attached. This rotary motion being in a direction contrary to that which has been imparted to the parts in setting the apparatus—that is to say when the shaft A has been turned—the result will be that the dial will be brought back gradually to the zero position and at the same time the pin of the crank M will fall into a notch of the disc D, and thus cause the valve V to close-down upon the gas pipe U.

Automatically Cutting-Off or Reducing the Gas Supply to Cooking-Vessels.—No. 145,384.

HÖJGAARD, A. C. E., of Copenhagen, Denmark.

No. 8893; March 26, 1920.

The distinguishing feature of this invention consists in a piston actuated by steam-pressure being placed within the hood serving as a lid for the kettle, fastened to one end of a flexible rod, to the other end of which the valve-member proper is fastened.

Another feature of the invention consists in the provision of a locking device, by means of which the valve-member may be retained in the position into which it has been moved, so that the supply of gas may either be cut-off entirely or maintained to an extent corresponding to the reduced flame.

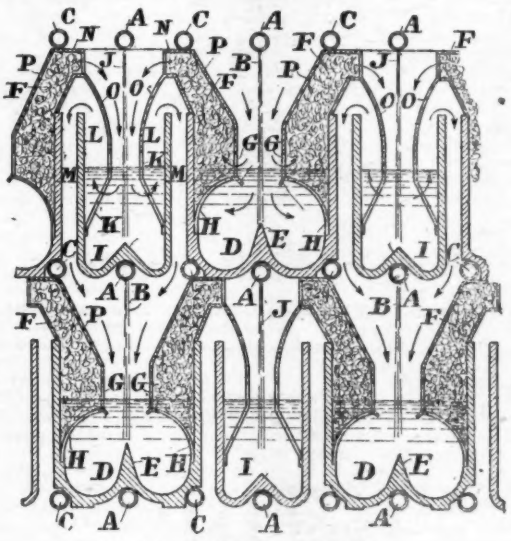
The advantage of the device consists mainly in the simple arrangement for transmitting the motion imparted to the plate or piston by the steam-pressure, and in the adaptability of the device to cooking vessels of any kind, provided that they are fitted with a spout into which the hood may be inserted, so that the entire device may remain attached to the gas cooker, and no special device will be required for each kettle or each cooking vessel.

Washing and Scrubbing Coal Gas.—No. 145,856.

BROCKWAY, F. G., of Elland, Yorks.

No. 7986; March 31, 1919.

Washing apparatus in accordance with this invention is constructed of iron, preferably rectangular in plan, across the entire width of which are disposed tiers of troughs and baffle-plates, and pipes for circulating the washing liquor. The only power-driven appliances required are one or more circulating liquor pumps, of drum or centrifugal pattern, placed outside or below the washer—for example, one small centrifugal pump to every two superposed tiers of troughs.



Brockway's Washer and Scrubber.

In the vertical section shown A are the liquor distributing pipes of concentrated jet type, producing a curtain liquid B, and C are the spraying pipes. Each primary trough D has a midrib E and duplicate outlet chambers F filled with scrubbing material. The gas at each side of the liquor curtain B passes either through the vertical perforated plate G or through the curved perforated plate H (the plates being separated by a baffle-plate) and through wet scrubbing material in the chamber F into the secondary trough I, which has a midrib, and is there directed by the liquor curtain J towards the bottom of the trough, whence it passes through the perforated plate K, ascends the passage L, and is carried down the outlet pipe M into the lower primary trough D, and so on.

The roof or partition plate N of the chamber F on which each spraying pipe rests may either be perforated to give the liquor direct access to the upper portion of the scrubbing material in the chamber, or alternatively the pipe C may have a nozzle passing through the plate N and delivering liquor into the scrubbing material. The major portion of the liquor delivered from the pipe is however intended to trickle down the plates O and P and fall in front of the perforated plates K, G.

Gas-Meter Indicators.—No. 146,046.

GLOVER, A. W., and GEORGE GLOVER & CO., Ltd., both of Royal Avenue, Chelsea, S.W.

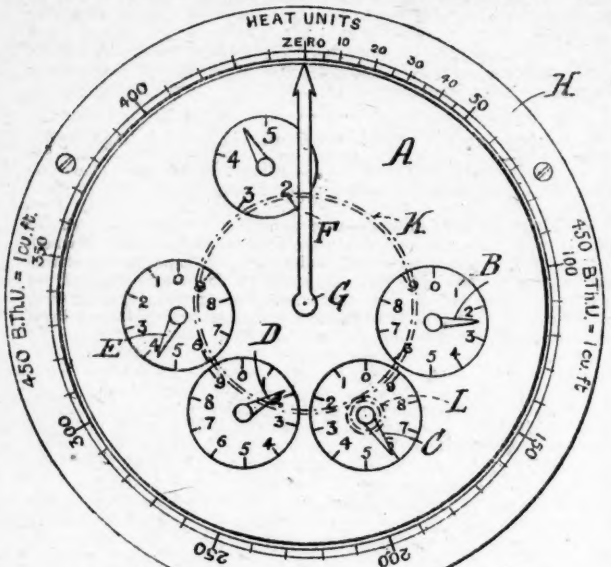
No. 32,104; Dec. 22, 1919.

This invention has for its object to combine as an integral part of the ordinary indicator that registers the consumption of gas in cubic feet another indicator that registers consumption in heat units—both indications shown on one dial.

An ordinary meter dial, the patentees explain, comprises three or more indicator fingers each working round its own circle, and geared in series in such a manner that each finger of the series rotates at one-tenth of the speed of the preceding finger in the series. By the present invention, they combine with an indicator of this kind another finger

adapted to turn about a central axis and geared to the spindle of the second finger of the ordinary indicator that indicates thousands of feet. The ratio of the gearing is 1 to 10; so that this special finger rotates at the same rate as the third finger of the ordinary series which indicates in tens of thousands. Consequently one complete revolution of the new or special finger will be made when 100,000 c.ft. of gas have been passed through the meter.

The unit now to be adopted for charging according to heat value supplied is equal to 100,000 B.Th.U.—designated a "therm." If therefore the scale round which the special finger travels is so divided that one revolution corresponds to the number of B.Th.U. in one cubic foot of gas, the finger will indicate in therms the heat value of the gas passed through the meter. The dial on which the special finger indicates is a ring which surrounds the ordinary dial, and is made removable so that a ring divided to agree with the heat value of the gas in any particular district may be attached to the index.



Glover's Combined Cubic Feet and Therm Meter Index.

In the composite dial constructed accordingly, A is the ordinary dial, having four fingers B, C, D, E, indicating the consumption in cubic feet. F is a special finger turning about a central axis G, geared in the ratio of 1 to 10 to the axle of the finger C. The finger therefore rotates at the same speed as the finger D. H is a detachable ring surrounding the dial, screwed to the index-frame. The ring has a scale near its inner edge. In the example shown, there are 450 divisions in the complete circle; and a complete rotation of the finger F corresponds to 450 therms delivered by the meter.

This scale of course will only be correct when the gas supplied has a value of 450 B.Th.U. per cubic foot. Should the gas have a value of (say) 400 B.Th.U., then a scale divided into 400 parts would have to be used; and similarly for any other quality of gas. If the calorific value of the gas in any district be changed, a simple method of altering the indicator is to use a varnished paper ring attached on the outside of the glazed bezel that encloses the front of the index—such ring being provided with a scale corresponding to the altered quality of the gas. The zero point of the scale can be set to agree with the position of the index finger F at the time the change is made.

The gearing connecting the fingers (not shown) is of a construction well known—effected by two pinions, one of six teeth gearing with one of sixty teeth on the axle of the next finger in the series. A similar pair of pinions K, L (indicated by broken lines) gears the axle of the finger C with that of the finger F.

Gas-Works Accounts at Bolton.

The Bolton Gas Committee's report to the Town Council states that the gas made in the year ended March 31 was 1,069,099 c.ft., as compared with 989,127,000 c.ft. in the previous year; the make per ton of coal carbonized having been respectively 14,587 c.ft. and 13,405 c.ft. The unaccounted-for gas was reduced from 4·38 p.ct. in 1919, to 2 p.ct. last year. At the Gas Street works, the new installation of vertical retorts has been commenced, but will not be ready for work until the autumn of next year. The Lum Street works produced 57 p.ct. of the total gas made; and the manufacturing results are stated to have been very satisfactory. Referring to the operations generally under the Engineer and Manager (Mr. W. J. Smith), the Committee say: "The figures for gas made and sold per ton of coal carbonized are the highest on our records; and the results obtained in the manufacture of gas are a very valuable asset in the balance-sheet. The cost of gas into the holder is less than last year, despite an increase of £8528 on coal (less rebate), and an increase of £7711 on carbonizing wages; and while partly attributable to increased receipts from residuals, and increased sales of gas, the result is largely due to the fact that less coal has been carbonized, producing 80 million c.ft. more gas than last year, of equal quality, together with other economies, which are the outcome of careful and painstaking management. The consumption of gas still continues to increase; and it has been necessary to order a complete gasification plant of half-a-million c.ft. per diem capacity, to cope with the demand for gas during the coming winter."

MISCELLANEOUS NEWS.

EUROPEAN GAS COMPANY, LTD.

A Loss on the Year's Operations, but Revised Prices to Effect Restoration.

The Ordinary General Meeting was held last Tuesday, at the London offices, Finsbury House, Blomfield Street, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. F. Eliot Williams, O.B.E.) read the notice convening the meeting, and the Directors' report and the statement of accounts. The report was as follows:

During the year under review, the utmost difficulty was experienced in maintaining the supply of coal to the stations, but, in spite of the restriction of exports from England, and the refusal of the British Government to allow the Company the use of its own boats since the autumn of 1919, coal was obtained from various sources by the special efforts of the Company's local staff, and in no case has the supply of gas been interrupted. The price of coal, however, reached an unprecedented figure; and the Company's contracts at favourable prices were moreover cancelled by the English Coal Controller. The coal actually obtained was of inferior quality, and the returns from residuals suffered proportionately.

While certain moderate increases in the price of gas had been obtained during the progress of the war, they proved to be quite inadequate, being gradually counterbalanced by the high price of coal, freights, and all materials, and the general and heavy increase of wages and salaries in France. These advances became intensified after the conclusion of the war; and the previous increases in the price of gas were overwhelmed when the phenomenal fall took place in the exchange value of the franc. This last source of loss, representing a depreciation from the rate of about 27 to an extreme of 58, seriously affected the financial operations of all companies buying coal in England, and especially of this Company, which pays its dividend and administration expenses in sterling. The result was not only to prevent any profit being made, but to cause a loss on the Company's operations in France of £330,008 6s. 8d.

Recent French jurisprudence having clearly recognized the rights of gas companies to relief in the present abnormal conditions, not only for the future, but also for any previous losses, urgent steps had already been taken to obtain temporary commensurate increases in price pending the introduction of sliding-scales, to be settled by experts, based on the advanced costs. It is most satisfactory to record that in almost every case the Company's applitions met with a sympathetic reception at the hands of the municipal and communal authorities. But until the experts on both sides have satisfied the authorities as to the definite figures for a sliding-scale and as to the amount of arrears due, it is not possible to estimate precisely the financial position of the future.

Therefore, in the circumstances, the Directors do not feel justified in recommending the payment of a final dividend for the year 1919-20. They have every hope, however, that the Company's business will soon be re-established upon a remunerative basis.

The total sales of gas showed the satisfactory increase of 10·52 p.ct.

In view not only of the high price of materials, but also of the continued scarcity of labour and the difficulty of the financial position, outlay upon repairs and upkeep has been reduced to a minimum; but, owing to the energy of the managers abroad, the condition of the works has been much improved in the course of the year.

To replace the s.s. "Nantes," torpedoed during the war, the Directors purchased in April, 1919, the s.s. "Bolbec," which rendered good service to the Company until directed by the British Government to be placed in the London coal trade.

The Directors report with much regret the resignation, through ill-health, of the Deputy-Chairman, Mr. R. S. Gardiner, in whom they have lost a most able and valued colleague. The vacancy thus created has been filled by the election of Mr. F. H. Jones, hitherto Consulting Engineer to the Company. Dr. C. C. Carpenter has been elected Deputy-Chairman.

After 55 years of service in the gas industry, of which 32 years were spent with the European Gas Company, M. Gautier, Manager at Havre, has retired on a well-earned pension. His place has been taken by M. Coudelou, of Rouën—thus necessitating promotions and changes at other stations.

The Directors who retire by rotation are Messrs. F. H. Jones and A. T. Eastman, and the retiring Auditors are Messrs. G. C. Goldsmid and W. B. Brady, all of whom, being eligible for re-election, offer themselves accordingly.

A HEAVY LOSS—FAIRNESS OF THE FRENCH PEOPLE.

The CHAIRMAN said it became his duty—and it was not altogether an acceptable one to an optimist like himself—to move the adoption of the report and the statement of accounts. To those of the shareholders who had followed the history of gas undertakings in this country, it might have been a surprise that this particular European Company kept on paying dividends of 7½ and 5 p.ct. when the dividends of English companies were falling from 6 and 7 p.ct. to 3 p.ct., and even to £2 12s. 6d. p.ct. He confessed that it struck him as strange, being on both sides of the hedge. But they owed the satisfactory position of being able to pay these dividends, and 2½ p.ct. dividend for the first half of last year, entirely to the sense of justice and probity on the part of the French people (on which feature of their relations with them he had often remarked) in rigorously paying their debts for gas while the Germans were trampling on them, and were at their throats, and destroying their property. In the early stages of the war, the French people saw what was inevitable by giving the Company a small advance in the price of gas. Some two years after the war started, the chief towns began to give the Company an increase of something like 25 p.ct.—raising the cost of their gas voluntarily to 25c. per cubic metre where they had been paying 20c. under the concession. This kept the Company alive, and in good heart. The coming of peace brought no peace or prosperity to the Company, because the expenses rose to an extraordinary degree, chiefly through the depreciation of the franc. The result was that in the four months from December to March last, they lost a considerable amount of the profit that they made in the previous nine months of the year. The loss was a large sum, as would be seen by the report. He had often remarked during the war on the rectitude, probity, and fair-play of the French people, who promptly sent on their remittances to pay their gas bills—practically £70,000 came in every Board day.

There were these large sums coming in and going to the bankers regularly; and it amazed him that a nation suffering such severe trials, privations, and the terrible oppression of their enemies in a large part of the most fertile territory of their country should have so rigorously and carefully met the Company by paying their demands. He had frequently commented upon this to his colleagues as well as to the shareholders; and it was an extraordinary tribute to the probity of the French people.

HIGH PRICES AND A BOOM IN CONSUMPTION.

To show how little the first advance in price affected the consumers, they increased their consumption of gas by as much as 10½ p.ct. There was hardly a gas company in the neighbourhood of London who, for the period of 1919-20, had got anything like an increase of 10·52 p.ct. in consumption. This showed how successful was the supply of gas, notwithstanding the fact that in England and necessarily in France, because the coal was so inferior, the gas had been very bad and very dear. Still there had been a boom in gas, although the shareholders got no dividend. They might like the assurance from him that, though he had lived the greater part of his life in the gas industry, never in the whole history of gas had he known it to be booming in the way it was to-day. It was impossible to make good gas with bad coal. The gas had been bad; but the consumers had been tolerant of it in Europe as well as in England. They paid a high price for it; and yet it went on advancing in their esteem and use. The time was coming when they would look back on this year of terrible anxiety, hard work, and labour for the staff and Board not all as a time of trial, but like most adversity it had its sweet use in the fact that it had shown there was nothing better than gas as a fuel, though so bad as the quality they had been able to give their consumers. With better coal, they would be able to improve the quality, as well as to get a proper price for it.

THE FALL OF THE FRANC.

The report had stated the causes that led to the avalanche that culminated in the tremendous fall in the value of the franc. When last the Directors were on a visit to the stations—some of them had paid two visits in the twelve months, and he was proposing to his colleagues that there should be another visit in the next two or three months, which showed they were not unmindful of looking after the property in a thorough manner—the franc stood at 60 or thereabouts, while they were accustomed to find it at about 25. While they were buying coal, and paying for a large amount of administration in one coinage they were reaping revenue in another coinage; and no company could stand a depreciation of 140 p.ct. of the money paid for gas without abandoning every idea of profit. It would have paid them to have done the same as had been done in some other towns—to have shut-down their works. But having often had their concessions with these honourable, fair-minded people renewed from time to time, it would have been unfair to take advantage of anything which was against their own profit; and so the Directors decided they must lose money, and give them gas—relying upon their good nature to compensate the Company.

A COMPENSATING PRICE, AND A STRONG PROTEST.

One of the most important documents that he had received in connection with the history of gas—it was so interesting that he had forwarded a copy to the Board of Trade—was a circular sent out by the Minister of the Interior of France to the Prefects, warning them that the case of the gas companies was an extreme one, that those who had to supply gas had high wages and high coal prices to pay, and so they should receive every consideration. The price of coal in Paris had been for nearly two years about £10 per ton. The spirit they saw in this circular was animating the Mayors. Only that day they had received a message from Caen that they were agreeing to pay the extraordinary rate compared with any English charge of 1 fr. 25 c. per cubic metre, while the original contract was for 25 c. This was a fivefold advance. In this country, gas consumers were not paying anything like fivefold for their gas. They were paying something like 100 p.ct. more; but not 500 p.ct. However, the Company were at the present time getting something like this amount for their gas, which would pay them, and recover some of their loss. It would be the first business of the Board to devote to the liquidation of the accrued arrears some part of the revenue derived from the new price. The price was more than it was intended to be; but it was intended that it should not only comprehend a living profit from the sale of gas, but afford a margin to compensate the Company for the past. He hoped the shareholders would do, as he was bound to do himself—buy European gas stock even to-day when there was no dividend upon it. He wished he could think that the British had been as fair in respect of coal to these fair-minded people, as the latter had been to the Company in respect of the price of gas. In his opinion, our Allies who had fought for our frontiers as well as their own, had, in regard to the price of coal and the limitation of exports, been treated in a very scurvy fashion. ["Hear, hear."] Not only had the French been treated scurvily in the matter of coal, but the Company had a fleet of ships, with a carrying capacity of about 2000 tons each, for conveying coal to discharge their obligations to supply gas to the people of France; and these ships had been taken from the Company by the Government. The report gave the shareholders some details of that. The Company had not had the use of these ships since, practically, September of last year. And what did the shareholders suppose the Government had been doing with them? They had been using them for fetching ore for the steel makers instead of carrying coal to the poor French. The Company had had to pay freights fourfold what it was costing them to run their own ships; and they had had to pay that fourfold price to aliens. It showed there was something wrong in connection with the methods of the Government, who boasted that they had business men at the head of their departments and committees. People representing such companies as their own were not on these committees as they ought to be. It was a strange thing that the Company could buy in France, at a most formidable price, British coal of inferior quality which had been got there by some means or other; but the Company were not allowed to purchase that coal first-hand in order to make gas for their consumers in France. He would like an explanation of that; and he would get up if he were a member of Parliament. British coals had been treated in a most capricious manner—in a manner that required a good deal of explanation. Their General Manager, when he went to one of the public offices about the use of their ships, was treated in a most supercilious manner, and was given foolish answers. [A SHAREHOLDER: That is a wrong policy, Sir.] If any of the shareholders had seen the speech that Lord Inchcape recently made at a meeting of the great shipping company of which he was Chairman, they would have seen how the whole of this Government control had grown into a vast bureaucracy. He had no doubt that the men who were put at the heads of these departments were eminent in their own spheres of life; but they left their work to underlings, some of whom had neither manners nor methods which were satisfactory to the people with whom they had to deal or treat. He thought the shareholders would agree that in no place where coal was £9 or £10 per ton was it possible to make gas and sell it at ordinary prices. The Company's price during war time compared with about 4s. per 1000 c.ft.; and they made a profit. But the cost rose to 18s. at the consumers' meters without any profit. There was a rebate, of course, in the nature of revenue from residuals; but they had not developed in France in the way they had in England, where there were tar and acid works. However, the loss for the whole year, and it had been greater during the last four months, had meant something like 2s. 9d. per 1000 c.ft.

SOME GENERAL MATTERS.

With regard to the general affairs of the Company, he had told the shareholders that the total sale of gas was very satisfactory. The Board were sorry they could not recommend a dividend. At the time they made an assessment of the Company's position to pay the interim dividend, Mr. Gardiner (their respected colleague, who had resigned on account of ill-health) urged that they should pay a dividend at the rate of more than 5 p.ct. per annum, or 2½ p.ct. for the half year. The other Directors resisted this; otherwise the loss would have been greater. It would be seen from the report that they had replaced their lost ship. About the state of the works, a little before this time last year, his colleague the Deputy-Chairman (Dr. Carpenter) went with him and other Directors and inspected the works. At that stage, they were in a condition which he would not call bad, but they were not very satisfactory. When they visited them again at the end of the spring of this year, they showed that the changes of management—fresh men at the higher salaries they were being paid—had had an effect, and the condition of the works was considerably more satisfactory. In the course of the year, the Board thought it well to give a pension to their senior manager (M. Gautier, of Havre), who had long since applied for means of retirement. They satisfied him. With tears in his eyes, he thanked the Board for the generous allowance; so that the shareholders might be sure it was adequate. They had to fill the vacancies that were created; and they had done so from members of the Company's own staff, which was a matter of great gratification to the Board. The Board (all of whom were experts in gas management) knew that promotion from the ranks of their own officers was the life and soul of efficiency and loyal service. They wished M. Gautier good luck in his retirement; and he (the Chairman) hoped he would live long to enjoy his pension. The effect was that they improved the position of these members of their staff and their emoluments.

WAGES OF EMPLOYEES.

At the same time wages and salaries in France had gone up much beyond what they had done in England. Nevertheless, when a call came for higher wages, the Board consistently gave a little more than the managers recommended. Even then hardly three months elapsed before the attention of the Board would again be called to the fact that the price of commodities had risen, and another increase was claimed. The Board did not hesitate to give the extra, because they felt and knew that a satisfied and contented condition among the employees—staff and workmen—was necessary to the success for which they looked, and thought it would be in the Company's best interests. He was quite sure the shareholders would not like to think the employees of the Company who fought for them as others, and who belonged to a nation who had treated the Company so well and liberally, should suffer in the slightest degree; and so the Board had taken good care that neither they nor their wives and children should suffer. They had made an arrangement, too, whereby the men with large families should have extra consideration. It must be remembered that this tended to encourage an increase of population, which was so necessary to give plenty of employees to the French for the future. This was not altogether unwise. It was not the invention of the Company. It was the desire and wish of the French people themselves. The Board felt they could not, as aliens doing business in France, fail to conform to any principle which the French people thought wise and proper procedure.

DIRECTORIAL CHANGES.

He wanted to deal with the question of the Directors. When they lost Mr. Gardiner, they lost a very strong man. The day had gone by for what he might call guinea-pig directors. They wanted working directors—men with some knowledge. Mr. Gardiner represented certain large collieries, and some large gas companies. He was formerly Chairman of the British Gas Light Company and of the Danish Gas Company, and Deputy-Chairman of this one. He brought to their counsels knowledge which could not be called anything but expert. It was a weakening of the Board when Mr. Gardiner felt it necessary to surrender his post. Their late Deputy-Chairman wrote him a letter in which he earnestly and warmly advocated that the vacant seat on the Board should be filled by the election of the gentleman who was now in that place; and his re-election would be proposed by Dr. Carpenter. The Board were quite unanimous that they should elect more strength. One of the members was so kind as to tell him (the Chairman) he could not live for ever [Laughter]; and so it was better to provide for the administration of the Company one who was thoroughly trained in all the steps of the policy which was now being pursued. But he (the Chairman) did not mean to go so long as he could help it.

PROMINENT FIGURES.

The accounts showed some significant things. A little while ago they had half-a-million of securities which they could then sell at a high

price anywhere. But the shareholders knew how the war had knocked these about. They had had to turn some of the securities into ships, which was a very fine security to-day. He might tell them that, owing to the prices charged for freights during the latter part of the war, their ships had worked very profitably. This was a fine thing to have in place of the gilt-edged securities, which fell as fast as common gas shares. The Company had gone to their bankers for £391,000 and the war loan of £38,000—making £430,000. This showed at once how extraordinary had been their position. They had had to leave their francs in France, and borrow money on them there until the bankers told them they were full of francs. He had striven to show the shareholders in perhaps an incoherent manner the history of their affairs, and he hoped he had succeeded.

The DEPUTY-CHAIRMAN (Dr. C. Carpenter) said, having regard to the very lucid statement the Chairman had made, he thought he should be fulfilling his duty if he formally seconded the adoption of the report. The Chairman had explained the peculiar difficulties under which the Company had been working, not during the whole of the past year, but during a comparatively small portion of it. Practically the whole of their difficulties arose quite suddenly in December of last year, and the whole of the change in their position had happened in the short period since. He should also like to emphasize another point—that the statement, sad though it was in some respects, did not imply that the Company were in a bad way. He should like the shareholders to remember and believe, as sincerely as he did himself, that the Company were far from being in a bad way, though temporarily faced by unexpected difficulties.

The motion was unanimously carried.

THE INTERIM DIVIDEND.

On the motion of the CHAIRMAN, seconded by the DEPUTY CHAIRMAN, confirmation was given to the dividend of 5s. per share paid as interim dividend in February last, less 4d. per share for duty in respect of all shares held in France.

THE NEW DIRECTOR AND RE-ELECTIONS.

The DEPUTY-CHAIRMAN (Dr. Carpenter) said this proposal was one for which in one respect he was peculiarly responsible. He thought it was almost the only matter in which, during a long professional knowledge of, and friendship for, the Chairman, they had ever had a disagreement. But it was customary with their Chairman, as soon as he found that the arguments against any opinion he might hold were sound and well founded, to be the first to give way. When he (the Deputy-Chairman) had an opportunity of visiting the French works as he did for the first time last autumn, he was very much impressed with the great importance there was in these days for considering, in the broadest possible sense, the reconstruction of their business under principles, and under conditions with which they were not so fully face to face before the war. Before the war the works went on in their normal way quite satisfactorily. They did their part as a series of mills going round; and they turned out what was required in the form of dividend. The war had put them to a great test, and not only that, it had altered, and he feared altered permanently, a great many of the conditions under which gas supply was carried on. It was one thing to get a concession altered as they had done, thanks to the fairness and breadth of the principles underlying French regulations; but there was another not less important question facing the Company. It was the extent to which the business would be interfered with by the high prices of labour and coal which were likely to be operative for a considerable time. The shareholders would quite understand it was one thing to have a concession altered and basic prices fixed which would enable the Company under ordinary circumstances to make both ends meet, and to pay something like the dividend to which they had been accustomed. But these prices were no good if the costs for coal, materials, and labour were so high that the business was seriously damaged. The only counteraction one could take in positions of this kind was to have the very best methods of manufacture and direction and control that it was possible to give; and the matter was not rendered any more easy, when one realized that the works were to some extent scattered about in a fairly large area of Northern France. The Chairman had said the day had gone by for guinea-pig directors; and he (the Deputy Chairman) supported that announcement. It was for this reason that he proposed the election of Mr. Frank Jones as a Director of the Company. It might not be known, but he could tell the shareholders, that Mr. Frank Jones was one of half-a dozen of the leading gas administrators of the day; and he thought if they were to ask him who were the other five, he would have a certain amount of difficulty in telling them—always being allowed to exclude the earlier generation of which Mr. Jones' father was such a distinguished ornament. In these circumstances, it was no good standing upon ceremony. They had to get the best qualified director to fill this position, so that the very best use might be made of the knowledge and ability which that person possessed. For this reason he strongly impressed upon the Chairman the importance of this step being taken; and he urged most strongly on the shareholders that they should emphatically support the proposal that Mr. Frank Jones be elected a Director of the Company.

Mr. A. T. EASTMAN, in seconding, said that he had no doubt whatever that what was proposed was the right thing to do. When they lost such a valuable Director as Mr. Gardiner, it was a time of unprecedented difficulty. He himself was away in ill-health, and after considering the question of the appointment of a new Director, he wrote to the Chairman to the effect that, so far as he knew, it would not be possible, searching through the gas world of London, to find a more suitable Director than the gentleman who had been advising them as Consulting Engineer. He said this without being aware that Dr. Carpenter had made any suggestion. Mr. Frank Jones had all the necessary qualifications, together with a knowledge of their Company and works; and Dr. Carpenter was convinced that he was the right man. Therefore, no other consideration ought to interfere with the appointment of Mr. Frank Jones in the interests of the shareholders. This was the feeling of the Board as a whole.

The CHAIRMAN remarked that he had consulted Mr. Gardiner (upon his resignation) to see whether the whole Board were unanimous; seeing that he himself had some little difficulty as the nominee was his own son. Mr. Gardiner wrote that he considered the then proposed new Director would be a most valuable acquisition to the Board. He had converted the whole of the carbonizing plant at their works; and therefore knew his job.

The motion was unanimously carried.

Mr. FRANK JONES very heartily thanked the shareholders for his re-election.

Moved by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, Mr. A. T. Eastman was also re-elected.

On the proposition of Mr. G. ACTON DAVIS, seconded by Sir F. M. FRY, the Auditors (Messrs. G. C. Goldsmid and W. B. Brady) were re-appointed.

VOTES OF THANKS.

The CHAIRMAN moved a resolution expressing the appreciation of the shareholders of the efforts of the staff and employees. He commented upon the faithful services of all, and of the hard work which they put in. Many of the staff in France—managers and men alike—men of superior education and training, freely gave themselves to the war, and obtained distinctions. They had come back just as eager to render good service, and to show they could fight in the arts of peace as well as of war, The shareholders were grateful to them for their services on the battlefield and on the works and for the Company. In the London Office, they had faithful and valuable officers; and he more especially mentioned the General Manager (Mr. Williams), the Accountant (Mr. Heather), and the officer who acted practically as Assistant Secretary (Mr. Martin). To Mr. Williams, he wished to give distinction by saying that his energy and his close assiduity had been of the greatest value and importance. It was something for a Company to lose such a man as his father, who knew every detail of the concern and every corner of their works, and it was not an easy thing for a young man to take over the mantle of such a father at so short a notice.

Dr. CARPENTER seconded the motion with the remark that he was delighted with the staff of the Company both abroad and at home; and to this the greater importance might be attached because of the absolute necessity in these times of having the best staff it was possible to obtain.

The motion was cordially passed.

The GENERAL MANAGER said he was sure the staffs both in France and in London would much appreciate this vote. It had been exceedingly disappointing to everybody to have had what was probably the hardest year's work in the history of the Company, and to have such a result to show at the end of it. The staff abroad had had difficulties with their coal. They thought they knew what coal difficulties were during the war; but last year they found themselves at times with only a few hours' stock. They had had to rush round with lorries to get coal from anywhere with which to keep the works going. On top of this, they knew towards the end of the year they were making gas at a higher price than they were selling it at. The managers would he was sure appreciate the fact that the shareholders knew their difficulties and were grateful to them. He thought he ought to mention that since the close of the year the situation had much improved—in this way, that the results that were put before the shareholders were prior to any of the big increases in the price of gas that had been mentioned. The 1 fr. 25 c. did not come into operation at the three largest stations before the year's accounts were closed. On behalf of all included in the vote, he thanked the shareholders.

Moved by Mr. DAVIS, and seconded by Mr. R. STEVENS, a hearty vote of thanks was passed to the Chairman and Directors.

OTTOMAN GAS COMPANY, LTD.

Impossible Yet to Submit Accounts.

The Annual Ordinary General Meeting of the Company was held on Wednesday last, at the Offices, Nos. 59 and 60, Gracechurch Street, E.C.—Mr. ARTHUR F. PHILLIPS in the chair.

The SECRETARY (Mr. C. J. Daun) having read the notice convening the meeting,

The CHAIRMAN said he regretted that, owing to Colonel Stephenson Clarke, the Chairman of the Board, being at the present time out of the country, he was not able to preside over the meeting, and had asked him (Mr. Phillips), during his absence, to as far as possible occupy his position. There was little business to transact. He was not able to propose the principal resolutions which were usually submitted at a general meeting, referring to the passing of the accounts and the declaration of a dividend. Unfortunately, notwithstanding every endeavour on the part of the Directors to present the shareholders with a statement of accounts, there were so many matters to be settled that it was not yet possible to do so. The Company's financial position was the cause of much anxiety. There were certain claims on the Smyrna Municipality before the war, and there were still further claims on the Ottoman Government which occurred during the war, and which presented considerable technical difficulty. He might remind the shareholders that the works were carried on by their resident staff under the control of, and with the assistance of, the Ottoman Government, who made many requisitions which amounted to a very considerable sum. The difficulty that presented itself was that these were debts contracted with an alien during the war. The whole matter had been placed before the Foreign Office, in the hope that some solution might be found. Their Manager (Mr. Cecil Gandon) was recently in England, and expressed sanguine views as to the future of the undertaking. The difficulties they had to contend with were the supply of coal and the great loss by exchange. The Directors regretted they were not in a position to give the shareholders more information, and they hesitated for the moment to express any decisive views as to the future. But the shareholders might rely upon it that everything possible was being done to protect their interests. The Company maintained that they had an exclusive right to the supply of gas and to

the number of street-lamps stipulated in the concession. Smyrna had now passed from Turkish control to the domination of the Greeks, who the Board trusted would protect the rights and property of the Company. He had no resolution to propose at this stage, but would be pleased to answer any questions shareholders might wish to put.

Mr. GEORGE SHAW asked if the works were still being carried on.

The CHAIRMAN replied that they were, and that the supply of gas was being maintained. American coal was being obtained, and was paid for out there. Fortunately, the Company were receiving some financial help from their bankers. The Manager told them that the revenue was more than covering the expenses; but he was unable to give them any assurance in the matter of the debts owing. He might mention that the Turkish pound was worth about 3s. 4d. now. If only they could get their debts paid, the Company would be in a good position.

Mr. E. L. BURTON said he believed the works were intact, and that the Company's property had been protected from damage.

The CHAIRMAN replied that this was so.

On the proposition of the CHAIRMAN, seconded by Mr A. M. PADDON, the retiring Directors (Colonel Stephenson R. Clarke and Mr. Strachan C. Clarke) were re-elected.

The Auditors (Messrs. Thomas H. Cooke and F. W. Church) were also re-appointed, on the motion of Mr. H. L. ANDREWS, seconded by Mr. G. SHAW.

Mr. ANDREWS said that, as a very old shareholder, he would like to propose a hearty vote of thanks to the Chairman and Directors. The Company had had many ups and downs; and, of course, just now dividends were impossible. He did not think any small undertaking had a better Board than their own Company; and he would like to couple with the vote of thanks the Secretary, the Manager, and the staff in Smyrna. He had relatives and friends in Smyrna; and he felt that the Company were very lucky in having someone on the spot in whom they could place full confidence. Mr. Gandon was a comparatively young man, and he had got through a fearful time exceedingly well.

Mr. COOKE seconded the vote, which was cordially passed, and briefly acknowledged by the CHAIRMAN and the SECRETARY.

THE ACCIDENT AT THE SALFORD GAS-WORKS.

At midnight on June 10, as reported in the "JOURNAL" at the time, a fire broke out at the Regent Road Gas-Works, Salford, in a 30 ft. square purifier, which had been emptied that day and left with the cover up ready for filling next morning. There were a large number of hurdle-grids in the box, which burned very fiercely, damaging the purifier-cover to such an extent that it had to be entirely reconstructed. The gas to the other three purifiers of the set of four which are worked from one centre-valve, was immediately shut off when the fire commenced; and these three boxes sustained no damage whatever.

On the following day, the gas was again turned-on to the three boxes; and the inlet and outlet pipes of the off-box, where the fire occurred, were carefully examined to see if there was any gas coming back from the centre-valve. But the centre-valve was found to be practically gas-tight. As a precautionary measure, however, both the inlet and outlet pipes inside the purifier were plugged-up with wooden stoppers, so as to hermetically seal the pipes from the box; and from the centre of each of these stoppers a 1½-in. wrought-iron ventilating pipe was carried into the open air. So gas-tight was the centre-valve, that no flow of gas was perceptible at the open ends of the 1½-in. ventilating pipes.

The work of reconstructing the damaged cover was placed in the hands of Messrs. R. & J. Dempster, Ltd., and commenced immediately. The three undamaged boxes could not, of course, be used in the ordinary way, as there were no means of changing a box, if necessary, during the repairs to the damaged purifier. But the inlet-valve to the purifiers was opened sufficiently to allow from 2000 to 3000 c.ft. of gas per hour to pass through the purifiers, so as to keep them constantly under pressure.

Meanwhile, the repairs to the damaged purifier (which was, for all practical purposes, in the open air, as the roof at that end of the purifying-house had been burnt-off by the fire) were being carried on as rapidly as possible. All went well until about 9.40 a.m. on Monday, July 26, when, from some cause which has not yet been ascertained, there was a sudden rush of gas into the box, inside which six of Messrs. Dempster's men were working. This gas became ignited (probably by a hot rivet); and the men working inside were severely burnt. The gas was at once shut-off from the purifying-house, and the men removed to the Salford Royal Hospital, where, unfortunately, one of them (Walter R. Morris) died the following day. None of the men working outside the box was injured.

There had been no smell of gas whatever during the six weeks while the repairs were being executed; and Messrs. Dempster's foreman states that he was himself in the box a short time before the accident, and there was then no smell of gas at all. The cause of the accident is being thoroughly investigated.

The annual outing of the employees of the Portsea Island Gas Light Company took place last Saturday week, to Hampton Court. Lunch was partaken of at the Court Restaurant, Hampton Court, where the party were joined by Mr. T. H. F. Lapthorn, J.P. (Chairman of the Company, Mr. T. Carmichael (Engineer), and Mr. H. A. Stibbs (Secretary), to whom cordial invitations to be present had been given. Mr. Boyne (District Organizer of the National Union of General Workers, and Vice-Chairman of the Regional Council for the Southern District of the National Gas Council) was also a guest. Responding to the toast of the Company, Mr. Lapthorn testified to the good relations which existed between the management and the staff, and the great pleasure he felt in being at their gathering. Mr. Boyne, replying to the toast of his Union, endorsed what Mr. Lapthorn had said, and added that, while he was out to do his best for the men, the Directors might count on him also doing his best to have every agreement which might be come to loyally carried out by the men.

THE GAS-WORKERS' DISPUTES.

Meeting in London.

On Tuesday of last week, a National Conference of Delegates of the unions embracing gas-workers was held in London, to consider the situation arising out of the recent sectional strikes in Mancheste Bristol, and elsewhere.

In Manchester, as reported in the last issue of the "JOURNAL," a scheme has been proposed for zoning and grading the area; and one of the proposals brought forward at the conference was that a ballot should be taken of the areas concerned on the suggested variations from the national terms. After a meeting lasting two-and-three-quarter hours, Mr. J. O'Grady, M.P., made the following statement to the Press:

> The whole question of the recent settlement in the gas industry was under consideration; and reports from the majority of districts indicated a great dissatisfaction. But having regard to that fact, the conference placed in the hands of the Negotiating Committee the duty of conferring with the National Federation of Gas Employers with the view of dealing with the whole question, and of considering new facts that have arisen. It is understood that the Negotiating Committee will take the matter in hand at once.

It was reported in regard to the gas-workers in the North-West area (which takes in Lancashire), that terms had been offered to the men which were considered to be an improvement in regard to the rates for week-end and Sunday work. There was also an improvement as regards the conditions for holidays. It was decided to recommend the men in that region to consider favourably the terms offered.

The meeting decided that further action on the wage question must be national, and to present a claim for another advance to all gas workers, of 1s. a shift or 1s. a day.

Manchester Dissatisfied with the Amended Proposals.

On the following day [Wednesday], there was a meeting of Manchester gas-workers to discuss the position arising from the latest offer of the employers [*ante*, p. 194]. Delegates were present from Salford, Stockport, and Radcliffe, who were prepared to follow whatever lead Manchester might give.

There was a good deal of spirited discussion of a resolution moved by one of the workers: That the terms be not accepted; that notices to cease work be handed-in as soon as possible; and that the full support of the National Union of General Workers be sought in this step. Some doubt appeared to exist as to how the voting went; but the Chairman (Mr. C. Priestley) and Mr. J. Williams (District Organizer of the Union) declared afterwards that the resolution was carried, though not by a large majority.

In moving an amendment that the terms be accepted pending the working-out of the grading and zoning scheme, Mr. T. Roberts said the men had not done badly. They had obtained the overtime rates they had claimed, and the double-time pay for Sunday work. They had asked for a holiday of fourteen days, and had been granted one of thirteen days. The difference between what they had asked for and what they had got was one day and some shillings. The meeting was breaking-up while Mr. Roberts was speaking; and the amendment was not put.

Mr. Williams reminded the men that a national ballot on the employers' terms was to be taken. It would, he said, probably be taken the following week. In conversation afterwards with a representative of the "Manchester Guardian," Mr. Williams said the resolution in favour of a strike must not for the moment be regarded too seriously. There could not, in accordance with it, be an immediate strike, as the sanction of the Union would first have to be obtained.

Concessions Accepted by Salford.

Acting on the recommendation of their representatives on the North-West Regional Council, the Salford gas-workers have accepted the concessions offered by the employers, though the mass meeting which accepted the offer did so under protest, on the ground that it was inadequate. The resolution passed by the meeting was worded:

> That we accept the terms suggested by the Regional Council *re* holidays, overtime, &c., but enter our protest against the meagre advance of 6s. nationally, and ask Mr. Williams to insist immediately on an improvement in the same.

The Salford men have thus broken away from Manchester. Mr. J. Williams (the Union's Organizer for the district) said, however, that after the Salford decision he had good hopes of a peaceful settlement in all the other towns concerned—Manchester, Stockport, Bury, and Radcliffe.

The Strike at Cheltenham.

With regard to the strike at the Cheltenham Gas-Works [reported in last week's issue], which arose out of the refusal of the Company to concede the wages' advance and the overtime and holiday conditions settled between the Gas Employers' Federation and the men's Union, it may be noted that all the unskilled workmen at present receive £3 1s. 11d. for a week of 47 hours; the stokers, for an average week, £4 5s. 6d.; and the coke-wheelers, £4 0s. 3d. The Company are already working at a loss; and they therefore find it impossible to exceed the above-mentioned rates of pay. The Directors, however, offered to submit to arbitration the men's claims for increased wages—which offer the men refused. The amount of wages paid in the manufacture of gas in 1913 was £6394, and in 1919 £28,255.

The withdrawal of the firemen, of course, led to the cooling of the retort-bench, which must mean considerable delay in restarting work.

Another Strike at Neath.

Neath has again suffered the inconvenience of a strike of gas-workers, who are dissatisfied with the recent national award. The trams were stopped, and a local hospital dependent upon gas for cooking had to use oil-stoves. The Mayor of Neath, himself a Labour leader, speaking at a meeting of the Council, denounced the action of the gas-workers, which was causing such great inconvenience to the

public and especially to the hospitals, which were entirely dependent upon gas for cooking and heating. He said the strike was unauthorized; but no "blackleg" labour would be introduced, and the works would remain closed until the men returned. Several works in the district dependent on gas for power were thrown idle.

The men claim that, as the neighbouring towns of Aberavon, Margam, and Briton Ferry have exceeded the award, and are paying the full 10s. increase and double time for week-end work, they should receive the same rate. The tram service between Briton Ferry and Skewen, which is operated by gas, has been suspended.

Protest at Burnley.

Burnley gas-workers have decided to accept the terms of the Regional Council as to holidays and overtime; but they protest against the meagre advance of 6s. nationally, and have asked their officials to insist upon an improvement.

Preston Workers and Holidays.

On the question of holidays, a meeting of Preston gas-workers has decided to press the claim for a fourteen days' holiday in the year, and that on this question there should be no differentiation between day and shift men.

Lightning Strike at Wigan.

After having decided three weeks ago to continue at their jobs in the public interest, pending further negotiations, the employees at the Wigan Corporation Gas-Works declared a lightning strike last Saturday, contrary to the advice of their own Union officials. At the conclusion of the morning shift, the Mayor (Mr. James Walkden), Mr. H. Farr (the Chairman of the Gas Committee), and Mr. Prior (a Labour member) addressed a mass meeting of the men at the works, pointing out the seriousness of the position, and emphasizing the fact that the Committee were in full sympathy with their case, though, as parties to any agreement entered into by the Regional Council, they could not take separate action. It was explained that negotiations between the representatives of the gas undertakings and the employees were still proceeding, and that the Committee had lost no time in placing the views of Wigan before the proper authority, having, as promised when the men decided to continue work, done everything possible to expedite a settlement that would be satisfactory to the workers. The men expressed dissatisfaction at the delay which had ensued. Mr. Lucas (the Secretary of the Wigan Infirmary) attended, and explained to the men that over 200 patients and members of the nursing staff were entirely dependent upon the gas supply for cooking and other purposes. The men, however, decided to strike forthwith; and the works were closed-down in the course of the afternoon, and the whole of the extensive industrial area supplied from the works, which has a population of about a quarter-of-a-million, was deprived of all gas services. It was stated that a demand had been put in by the men for an increase of 12s. per week on the old basis, as compared with the 10s. asked for prior to the recent award.

TESTS OF GAS AT SHEFFIELD.

The Automatic Records.

Referring, in their annual report, to the monthly tests of the gas supplied, the Sheffield Gas Consumers' Association remark that particular annoyance and loss to consumers is caused by irregularity in quality. Early in September the fluctuations of calorific value became most marked—in one case changing from 460 to 550 B.Th.U. within ninety minutes; but when the Gas Company's attention was drawn to this, the wide fluctuations ceased. The automatic records of the Association, when compared with the Corporation Gas Examiner's tests, showed in many instances that for the brief period during which the gas examiner is making his test the quality of the gas is enriched, with the result that the official tests appear satisfactory, while the gas supplied to the consumers during the whole day preceding or succeeding the test may be seriously below the standard. The discovery explained the great discrepancy which had been noticed between the Corporation's official tests and those of the Association. The Corporation tests appear to average one test for every 37 million c.ft. supplied by the Gas Company. In a previous year the figure mentioned was one test for every 49 millions. This should be compared with the Metropolitan average of one test for every 5 million c.ft. sold. Nearly two-thirds of the total gas sold in Sheffield is used for industrial purposes; and it should be quite clear to even the smallest consumer that the safeguarding of his interests by the activity of the Association repays him many times his small subscription.

Sir George Beilby, the Director of the Fuel Research Board, has on several occasions referred to the work of the Sheffield Gas Consumers' Association in most appreciative terms, pointing out that the records of the calorimeter, obtained by Mr. Imrie, and forwarded by the Association to the Fuel Research Board, gave most valuable information, and directed the attention of the Fuel Research Board to the urgent necessity of amply safeguarding consumers' interests.

PRICE OF GAS AT MANCHESTER.

What Increased Wages Mean.

A further early increase in the price of gas is foreshadowed at Manchester.

At a meeting of the Gas Committee last week, a report was presented which stated that the national advance of 6s. a week in the wages of gas workers would cost the department £25,000 per annum. Further proposals had been made, without prejudice, by the Regional Council with regard to Sunday work, holidays, and overtime, which, if granted, would mean a further additional cost of £15,000, making a total in-

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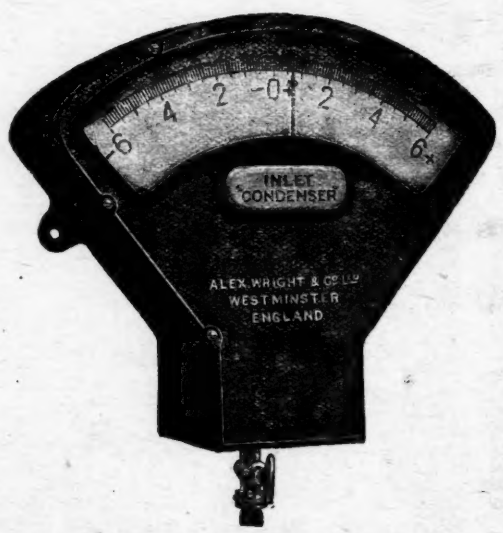

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crease of £40,000 a year. If double-time rates were granted for Sunday work, 6s. a week meant really 9s. per week to shift men, because 12½ p.ct. bonus was paid on earnings. The lowest wage paid to able-bodied men at the gas-works was now 73s. 6d. a week, as against 26s. in 1914—an increase of 183 p.ct. In addition, the hours had been reduced from 52 to 47. If double-time were paid for work on Sunday, machinemen in the retort-house would be earning for a week of seven shifts £5 17s. 9d., which would mean an increase of 162 p.ct. on pre-war rates. Other men in the retort-house would earn £5 15s. 3d., which was an increase of 174 p.ct. over pre-war earnings. The increased cost of living according to the Board of Trade "Journal" for July was 152 p.ct.

The price of gas within the city is now 4s. per 1000 c.ft., and 4s. 3d. is charged to outside authorities. It was also reported to the Gas Committee that since the beginning of 1919 the total amount of coal sent to the department from Northumberland and Durham by the orders of the Coal Controller amounted to nearly 50,000 tons. The extra cost incurred thereby over and above the normal cost of coal amounted to about 6s. a ton, or a total of some £14,000. Repeated attempts had been made to get the Manchester supplies direct from Lancashire and Yorkshire; but all efforts to influence the Coal Controller had proved unavailing. Lancashire and Yorkshire coal is being sent to other distant parts of the country. The quality of the Durham coal sent to Manchester was not so suitable for Manchester requirements as Yorkshire coal.

GAS AND HYGIENICS.

Address by Mr. R. J. Rogers at the Birmingham Health Exhibition.

A lecture on the subject of "Gas and Public Health" was delivered twice last week at the Bingley Hall (Birmingham) Health Exhibition, under the auspices of the Royal Sanitary Congress, by Mr. R. J. Rogers, Fittings Superintendent to the Birmingham Corporation Gas Department. The department is there represented by a stand of exhibits of gas labour-saving appliances, cookers, &c., for which the silver medal of the Institute was awarded.

Mr. Rogers said that gas exerted a potent influence on public health, though the fact was not generally recognized by the man in the street. From the point of view of coal conservation, the gas industry was doing valuable work. Coal was best utilized at gas-works; for, apart from gas production, a substantial revenue was obtained from a wide range of bye-products which were essential in many industries. Mr. Rogers also pointed out that, with the greater use of gaseous fuel, fogs were materially lessened, and damage to buildings reduced to a minimum. The very fact that there were 150,000 gas-cookers and 55,000 gas-fires in Birmingham, meant a tremendous difference in the amount of smoke that would otherwise be emitted from domestic chimneys. Some 50 p.ct. of the smoke of the city was estimated to be due to domestic chimneys. It had been stated that the cost per head of the population in industrial cities like Birmingham occasioned by damage to buildings, and the cleaning that was necessary in consequence of the smoky and acid-laden atmosphere, was equal to £1 a year, which in Birmingham meant £900,000 per annum. The public did not yet realize the harm done to health by smoke. He insisted that in the new houses increased use should be made of smokeless fuels. Coke was a cheap and efficient fuel for water heating, &c.; and coke-grates were being designed whereby adequate heat could be obtained, and with perfect combustion and without any smoke. Mr. Rogers mentioned that 95,000 gas-cookers were fixed in houses in Birmingham with penny-in-the-slot meters; and that the introduction of this means of cooking had led to a great improvement in the cooking of food. All medical men and health visitors were agreed on this point. As the business man installed labour-saving equipment, it was equally essential in the interests of married women and housekeepers that the same principle should be adopted in the home. The working man had the advantage of shorter hours; but what was being done in the same direction for the housewife? Was sufficient advantage being taken for her of the labour-saving devices that were obtainable? Women must be protected from mere preventible drudgery.

In conclusion, Mr. Rogers referred to the housing schemes, and the fact that the Birmingham Gas Department were laying, without charge, a service-pipe from the main, up to 30 ft. on private land, provided that the builder undertook to work to a standard specification, which meant the provision, during the course of construction, of pipes throughout the house (bedrooms included) for heating and lighting. By this specification, the supply of sufficient gas, would be ensured. At least 75 p.ct. of the complaints received about poor supplies were due either to the pipes being too small or to badly-laid pipes which were put in without any supervision on the part of the authorities. To the bedroom fire-place a ½ in. gas-pipe was laid, so that should a tenant at any time require to use a gas-fire, such provision could be made without disturbing the household.

Leicester Gas-Works Extensions.—It was reported at a meeting of the Leicester Corporation, on Tuesday of last week, that the Gas Committee had purchased two acres of land at Aylestone, adjoining property recently acquired, at a cost of £125 per acre. They recommended that in the next application to Parliament powers be sought to schedule the land for purposes connected with the manufacture and storage of gas, and authorizing the carrying forward year by year of a sum out of profits equal to a maximum quarter's gas rental, to obviate the necessity for large temporary bank overdrafts. The Committee have also purchased nine houses in Charles Street, adjoining the Belgrave Gate works, for gas purposes; and their action was confirmed by the Council.

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PRICE OF GAS AT BIRKENHEAD.

There was some discussion at the last monthly meeting of the Birkenhead Town Council with regard to a proposed increase in the price of gas from 3s. 9d. to 4s. 3d. per 1000 c.ft.

Mr. LUKE LEES, moving the adoption of the minutes of the Gas Committee, said there had been continual increases in the pay of employees and the cost of materials. As to wages, there had been an advance of £17,000 a year, with another £5000 in contemplation; and coal costs were 4s. 6d. a ton higher, or over £15,000 a year. The only means of getting back this £37,000 were efficient management and higher charges. They were asking for 6d. per 1000 c.ft. more, which would raise £24,000, and hoped to get better prices for the bye-products. Last year's working resulted in a gross profit of £43,942, and a net profit, after deducting income-tax, sinking fund, special expenditure, &c., of £3253, which had been carried to renewal and reserve funds, the latter of which now stood at £65,000.

Alderman NAYLOR moved reference back of the minute in regard to the increased charges, which, he contended, were not justified until further information had been given by the Committee appointed some months ago.

Mr. MADDOCKS, in seconding, said there was an unfortunate hesitancy about supplying to the Council facts and figures to which they ought to have free access.

Mr. EGAN, as a member of the Gas Committee, said no case was made out in the Committee for this increase of 6d.

Mr. TUTTY wanted to know in detail why it was that an undertaking which ten years ago gave £10,000 to the rates was now almost on the rates, though its income had increased by £100,000.

Mr. LEES, in reply, agreed that the Inquiry Committee should go fully into the whole finance of the gas undertaking. In the meantime, they must get this extra money.

On a division, there was a tie; and the Mayor gave his casting vote in favour of the Committee.

BURNLEY GAS ENGINEER'S REPORT.

In his report to the Burnley Corporation Gas Committee for the year ended March 31, Mr. J. P. Leather (the Gas Engineer and Manager) says that the make of gas was 810,763,000 c.ft., which was an increase of 15·36 p.ct. on the previous year. For that year, there was a decrease of 7·25 p.ct. Notwithstanding the increased cost of the gas, the quantity sold by meter exceeded the amount sold in any previous year. Glancing over the figures for the past seven years, it is seen that in 1913-14, the make of gas was 817,046,000 c.ft., while in 1916-17 it had fallen to 731,847,000, and in 1918-19 to 702,773,000 c.ft. The unaccounted-for gas last year was 3·64 p.ct., which compares with 2·78 p.ct. in the preceding twelve months.

In August, 1919, the Committee decided to supply gas for heating and other purposes than lighting or motive power at reduced rates where the consumption by separate meter for such purposes was greater than 10,000 c.ft. per quarter. The number of meters in use for this purpose at March 31, 1920, was 160. The system has only been in operation for a short time; but the average consumption of gas through these meters up to March 31 was 51,625 c.ft. per meter. The proportion of gas used for motive power last year was 6·5 p.ct. of the total, and that consumed through prepayment meters 40 p.ct.

It having been impossible during the year to obtain supplies of coal in the quantities desired, it was necessary to manufacture a larger percentage of carburetted water gas at a very high cost. Though a considerable quantity of coal of very inferior quality had to be accepted it was possible to improve the plant and methods of working so as to produce a larger quantity of gas per ton of coal; the figures being 11,335 c.ft. in 1918-19, and 12,756 c.ft. in the past twelve months.

The cost of gas-making materials (coal, gas oil, and coke used for water gas) was 30·01d. per 1000 c.ft. sold last year, or about 5d. more than in the previous year.

The amount paid for wages again shows a considerable increase; the figures per 1000 c.ft. of gas for the past seven years being: 1913-14, 7·11d.; 1914-15, 7·12d.; 1915-16, 7·36d.; 1916-17, 7·95d.; 1917-18, 10·77d.; 1918-19, 16·64d.; 1919-20, 18·62d.

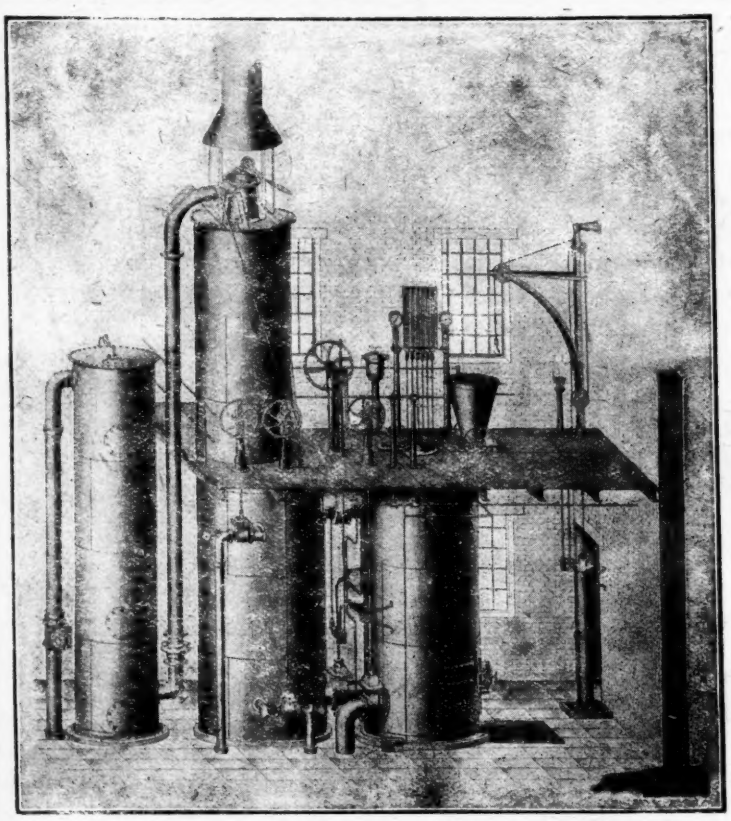
On the subject of the calorific power of the gas, Mr. Leather says "The average figure for the year has been 480 B.Th.U. per c.ft. This is a very high figure, considering the circumstances under which we have had to work, and represents a quality most suitable for the apparatus used by the ordinary consumer. Exceedingly good results may be obtained from this gas if the burners are in proper order. We have a staff of maintenance men who visit consumers on request, and adjust the burners free of charge."

The quantity of sulphate of ammonia produced during the year was 467 tons, which, allowing for the stocks of liquor at the beginning and end of the year, was equal to 23·3 lbs. per ton of coal, compared with 21·2 lbs. for the preceding year.

DUAL INSTALLATIONS FOR HOUSING SCHEMES.

A proposal to instal the electric light in certain houses which the Walsall Corporation are building, was discussed at last week's meeting of the Town Council. The Finance Committee had recommended that the scheme should be limited to one block of houses only.

Moving an amendment in favour of adopting this suggestion, Alderman Ingram remarked that the scheme put forward was a very big one, with the prospect of a very poor return. The Mayor (Mr.



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Tucker) supported the amendment, because he was rather alarmed at the amount of the expenditure involved, which he said was nearly £17,000, the estimated income from which was £1400 per annum. He criticized a proposal to supply the current at a charge to the tenant of 2d. per lamp used; and said that, if the Council agreed to this principle, every householder in the borough would be justified in asking for a supply of current on similar terms. Mr. Venables (the Chairman of the Gas Committee) mentioned that over £3000 had been spent already in laying gas-mains to the new housing sites; and it was understood gas would be used both for lighting and cooking. The idea of spending a further £10,000 was outrageous. On a vote being taken on the amendment, the Council proved to be equally divided, and the amendment lapsed. In reply to Mr. Parry, it was stated that in any case gas would be installed for cooking purposes. Mr. Parry said he should protest against an outlay of £5000 for such a purpose. Many of the tenants would be miners who would burn allowance coal, and would not want gas for cooking.

The Council approved, by 15 votes to 5, the carrying-out of the full scheme.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

August 2.

The average values for gas-works' products during the week were: Gas-works coal tar, 110s. to 115s. Pitch, East Coast, 175s. to 180s. per ton f.a.s.; West Coast—Manchester, 175s. to 180s.; Liverpool, 175s. to 180s.; Clyde, 175s. to 180s. nominal. Benzol 90 p.ct. North, 2s. 6d. to 2s. 7d.; crude 65 p.ct. at 120° C., 1s. 8d. to 1s. 9d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 4d. to 2s. 6d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. 1d. to 3s. 3d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 1s. to 1s. 0½d.; salty, 11½d. to 1s. Heavy oils, in bulk, North, 1s. to 1s. 0½d. Carbolic acid, 60 p.ct., 4s. to 4s. 1d. Naphthalene, £40; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

A firm tone prevails in most products. There is possibly rather less business (which is not unnatural for the holiday period), but prices remain high, and in one or two instances the tendency is still upward. Pitch remains very strong, especially on export account; and prices are firm. Indeed in South Wales more than £10 has been paid; and in the North sellers cannot be found at under £9 10s. per ton. Naphthalene, also, is in heavy demand; and sellers are difficult to find. The firelighter industry is hard-up for crudes; and up to £21 per ton is being paid for best sorts. Very inferior is about £10, and rather better at £12 upwards; refined flake is almost unobtainable, and over £50 is being offered for it; while over £60 is paid for ball. There is no change in the position of benzols; but the supply is not large. Creosote is firm at late rates. Carbolic acids are inclined to be scarce—especially crude 60s., although crystals are slightly cheaper. Cresylic acids are without change. There is practically no change in intermediate products. Aniline oil and salts are 1s. 10d. and 2s. per lb. respectively; but salicylic acid of technical grade is lower at 2s. 8d. per lb. Pyridine is wanted at up to 25s. per gallon.

The range of quotations is as follows:

Benzol: 90% London 2s. 5d. to 2s. 7d., North 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 4s. per gallon naked.

Crude Tar: London, 87s. 6d. to 90s.; Midlands, 85s. to 87s. 6d.; North, 85s. to 90s. per ton *ex* works. Refined tar, 65s. per barrel (free) on rail.

Pitch: London, 195s. per ton; East Coast, 190s. to 195s. per ton; West Coast, 185s. to 195s., with Manchester 190s. per ton, and Glasgow 190s. per ton; South Wales, 200s. per ton.

Solvent Naphtha: London, 3s. 4d. Provinces average 3s. 3d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined, £50 per ton nominal; inferior, £35; crude, £14 to £22, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 4s.

Creosote: London, 1s. 1½d. to 1s. 2½d.; North, 1s. 1½d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 9d. to 1s. 10d. per lb., drums extra.

Aniline Salts: 2s. to 2s. 2d. per lb.

Cresylic Acid: 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 6d. to 5s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 4s. 6d. per gallon; crystals 40%, 1s. 2d. per lb.

Salicylic Acid: Technical, 2s. 9d. to 3s.; B.P., 3s. 6d. per lb.

Xylol: Pure, 6s.; commercial, 4s. 9d. per gallon.

Sulphate of Ammonia.

Conditions in this market are very good; and substantial orders are being booked for this month at the fixed price of £24. The demand is exceptionally keen from Ireland. Export business is also of good dimensions, although prices are not so high as a few weeks ago—the demand from Japan having fallen off. In fact, for the present (until

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she can dispose of the material she bought speculatively some time ago) Japan is not a factor to be considered. Stocks of sulphate here are increasing slightly—not because of lack of orders, but through dealers and merchants booking-up for forward delivery.

Motor Fuel Prices.—At a meeting in Edinburgh, organized by the Automobile Association and the Royal Scottish Automobile Club, to start a campaign in Scotland on the subject of the price of motor fuel and the question of substitutes, a resolution was unanimously adopted calling upon the Government to carry out the recommendations of the Fuel Research Board on gas standards, and to remove the restrictions hampering the manufacture of commercial alcohol for motor fuel. It was also resolved to ask the Edinburgh and Leith Corporations Gas Commissioners to restore the provision for the manufacture at the gas-works of benzol.

Engineers and the Recent Wages Award.—Mr. Tom Mann (Secretary of the Amalgamated Engineering Union), speaking at Consett last Saturday, denounced the refusal of the Industrial Court to grant the engineers' demand for an extra 6d. an hour as "grossly insulting, damnably humiliating, and monstrously unjust."

The Smoke Abatement Committee.—The Executive Committee of the County Councils Association have appointed Dr. J. R. Kaye, County Medical Officer of Health for the West Riding of York, to give evidence on behalf of the Association before the Departmental Committee on Smoke and Noxious Vapours Abatement.

Dearer Mond Gas in Prospect.—The South Staffordshire Mond Gas Company have given notice of an application to the Board of Trade for permission to increase their charges for gas. Both for power and heating, if the quantity taken is not less than 4 million c.ft. per quarter, the price will be 11½d. per 1000 c.ft.; while if the quantity is less than this, the price is to be 1s. 0½d. per 1000 c.ft.

STOCK MARKET REPORT.

THE week just concluded has been a dull and a quiet one on the Stock Exchange. The quietude was normal, and only to be expected on the eve of August Bank holiday. The dulness was wrought by those disquieting factors which oppressed the preceding week, and which now continued to rule with equal, if not increased, gravity. The result was that markets all round were weakened. The gilt-edged department was no exception. In Home Government issues, the course was much the same as the week before. Friday's figures were: Consols 46¼-46⅝, War Loan 84⅜-85, Funding 69¾-70¼, Victory 77¾-78½. Bonds were easier, and Corporation loans weakened. Home rails were much troubled, and prices continued to give way. Canadians were fairly steady; but Argentines were very dull. In the Foreign Market, there was not much life, and movements were variable. French started well, but gave way later. Brazilian, Chinese, and Japanese did moderately. The Miscellaneous Market had not many good points. Rubber was let alone a good deal, and all but a few issues fell back. Oils varied almost from day to day, and (roughly speaking) gains and losses were about on a balance. Textiles, Iron and Steel, Shipping, and others were weaker.

Business in the Gas Market showed a falling off in point of activity; the volume of transactions marked being below the average. But the season of the year was doubtless responsible for this phenomenon. The tendency was mainly steady. Changes in quotation were few; and these mostly in *ex div.* adjustment. Gas Lights were firm, and got the benefit of the turn in *ex div.* quotations. South Metropolitan and Commercial were unchanged. Imperial Continental was hardly noticed; but European improved. Primitiva was steady.

Bargains done for cash during the week were as follows: On Monday, Bombay 4½, British 22½, European 5⅜, 6⅛, Gas Light ordinary 57½, ditto debenture 47¾, Imperial Continental 124, 125½, Lea Bridge 80, Oriental 100, Primitiva 12s. 6d., South Metropolitan 58, 58½, 59, ditto debenture 46. On Tuesday, Gas Light ordinary 58½, ditto maximum 41, ditto debenture 47¾, 48, Imperial Continental 125, ditto debenture 82, Sheffield "C" 55½, South Metropolitan 58¼, 58½, 59, 59¼, 59½, Tottenham debenture 61⅛, Aldershot 5 p.ct. 68½, Barnet District "A" 124½, 125, ditto "B" 110, 110½, South California 16½, ditto preference 90¼. On Wednesday, Brentford preference 72, Continental Union 25, European 5⅞, 6 1/16, 6¼, Gas Light ordinary 57½, ditto debenture 48, Imperial Continental 123, Primitiva 12s., 12s. 6d., ditto preference 30s., River Plate debenture 46⅛, South Metropolitan 58½. On Thursday, European 6¼, Gas Light ordinary 56, 56½, 57 *ex div.*, ditto maximum 39 *ex div.*, ditto debenture 47½, 47⅞, 48, South Metropolitan 58¼. On Friday, Gas Light ordinary 56⅜, 57½, ditto debenture 47½, Liverpool 59¾, Primitiva 13s. 9d., ditto preference 33s. 9d., South Metropolitan 58, 59⅛.

In the Money Market, there was a steady and pronounced demand which hardened rates materially, and which lasted nearly up to the close of the week, when the pinch was relieved. Discount terms were similarly affected. The Bank rate is 7 p.ct., as fixed on April 17.

Under a new scale affecting a general revision of salaries of officials in the service of the Loughborough Corporation, it was decided at the last meeting to increase the remuneration of the Gas Engineer and Manager (Mr. E. Onions) to £567 10s. per annum.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Mar. 11	4	4%	Aldershot 4 p.c. Pref. .	...	58—63	...
1,551,868	,,	Mar. 26	2½	3 1/16%	Alliance & Dublin Ord.	59—64	42—47	...
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	55—60	...
280,000	5	May 13	7½	8%	Bombay, Ltd. . . .	5⅛—6⅛	4⅜—5⅛	4⅛
50,000	10	Feb. 26	16	10%	Bournemouth Gas and Water: 10 p.c. . .	29—30	8½—9	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c. .	15—15½	9—10	...
115,000	10	,,	6	6/-	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	8—9	...
162,065	—	June 25	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid. .	261—266	45—50	...
734,920	,,	,,	11	26/3	Do. B New . .	204—209	43—48	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	68—73	72
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb. .	91—93	63—65	...
214,775	,,	Mar. 11	7¼	7½%	Brighton & Hove Orig. .	208—213	121—126	...
244,200	,,	,,	8	5⅛%	Do. A Ord. Stk.	154—159	80—85	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max. . .	...	...	...
530,000	20	April 14	12½	10%	British	44—45	22—24	22½
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	45—48	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref. .	4—6	5½—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	...	...
1,513,280	,,	Feb. 26	5/9/4	33/4	Commercial 4 p.c. Stk.	106—108	51—56	...
560,000	,,	,,	5½	26/8	Do. 3½ p.c. do.	103—105	44—49	...
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	27—32	25
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	...
51,600	,,	Feb. 26	14½	10½%	Croydon A 10 p.c. . .	...	130—140	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	..	90—100	...
492,270	Stk.	—	6	5%	Derby Con. Stk. . .	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd. . . .	17½—18	5⅞—6½	5⅞—6½
16,298,975	Stk.	July 29	4/17/4	30/-	Gas Light and Coke: 4 p.c. Ord. . .	98—102	54—59*	56—58½
2,600,000	,,	,,	3½	26/3	Gas Light and Coke: 3½ p.c. max. .	76—79	39—44*	39—41
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	55—58*	...
4,674,850	,,	June 25	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	46—49	47½—48
130,000	,,	Dec. 11	10	10%	Gas Light and Coke: 10 p.c. Bonds. .	...	...	...
82,500	,,	Mar. 11	5	3⅛%	Hastings & St. L. 5 p.c.	...	55—60	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	38—43	...
70,000	10	May 13	11	7%	Hongkong & China, Ltd.	16½—16½	8½—9½	...
86,600	Stk.	Mar. 11	9	6⅛%	Hornsey 7 p.c. . . .	...	88—93	...
131,000	,,	,,	7½	5⅛%	Ilford A and C . . .	151—154	86—91	...
65,780	,,	,,	6½	4⅜%	Do. B	115—118	65—70	...
63,500	,,	June 25	4	4%	Do. 4 p.c. Deb. . .	92—94	55—58	...
4,940,000	,,	May 14	9	4½%	Imperial Continental .	150—160	124—129	123—125½
1,235,000	,,	Feb. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	80—85	82
235,242	,,	Mar. 26	6½	5⅛%	Lea Bridge Ord. 5 p.c. .	119—121	80—85	80
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.: A.	211—213	...	59¼
					Liverpool 5 p.c. Ord.: B.	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Feb. 26	7/5/6	3½%	Maidstone 5 p.c. . .	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4½	1¾—2¼	...
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	89—96	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd. . .	11½—12	70—75	...
1,875,892	,,	July 29	4½	3½%	Newcastle & Gatsh'dCon.	98½—99½	60—61*	...
529,705	,,	June 25	3½	3½%	Do. 3½ p.c. Deb.	82—83	50½—52½	...
15,000	10	Mar. 11	—	8½%	North Middlesex 10 p.c.	...	13—13½	...
55,940	10	,,	7/14/0	6½%	,, ,, 7 p.c.	14—15	7½—8½	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd. . . .	117—122	99—102	100
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd. . . .	7½—7¾	2—3	...
60,000	50	Mar. 11	13	7½%	Portsea Island, B . .	128—131	66—71	...
100,000	50	,,	12	6½%	Do. C . .	118—121	53—58	...
249,980	5	April 29	8	—	Primitiva Ord. . . .	5⅛—6	⅞—1	12/—13/9
499,960	5	June 26	5	—	Do. 5 p.c. Pref. .	4½—5	1⅛—2	30/—33/9
521,600	100	June 1	4	4%	Do. 4 p.c. Deb. .	91—93	69—71	...
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	45—48*	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	45—48	46⅛
150,000	10	Mar. 26	6	6/-	San Paulo: 6 p.c. Pref.	10½—11	6½—7½	...
125,000	50	July 2	5	5%	San Paulo: 5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Mar. 11	10	50/-	Sheffield A	223—224	68—73	...
209,984	,,	,,	10	4½%	Do. B	222—224	58—63	...
523,500	,,	,,	10	35/5	Do. C	220—222	54—57	55½
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c. . .	...	...	...
90,000	10	June 25	9	9%	South African . . .	10½—11½	11—12	...
6,609,893	Stk.	Feb. 12	5/4/0	30/-	South Met. 4 p.c. Ord..	111—113	56—61	58—59½
250,000	,,	July 14	—	5%	Do. Pref. . .	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb..	72½—74½	45—47	46
224,820	,,	Feb. 26	8½	3%	South Shields Con. Stk.	157—159	99—101	...
1,087,795	,,	July 29	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	60—65*	...
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	71—76	...
647,740	,,	May 13	7½	3½%	Southampton Ord. . .	99—102	57—60	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 14	—	3½%	Tottenham District: A 5 p.c. .	135—138	60—65	...
782,275	,,	,,	6	3½%	Tottenham District: B 3½ p.c. .	115—117	52—57	...
181,253	,,	June 10	4	4%	Tottenham District: 4 p.c. Deb.	87—89	60—63	61½
182,380	10	Dec. 30	5	—	Tuscan, Ltd. . . .	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mar. 11	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	71—73	...
30,000	,,	Feb. 26	8½	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	83—88	...
255,636	,,	,,	6½	40/-	Do. B 3½ p.c.	129—134	61—66	...
108,075	,,	,,	—	38/6	Do. C . . .	...	61—66	...
140,865	,,	,,	—	38/6	New Ordinary . . .	...	61—66	...
352,000	,,	,,	6½	33/9	Wimbledon 5 p.c. . .	117—122	58—63	...
98,000	,,	,,	6½	40/-	Epsom 5 p.c. . . .	121—126	58—63	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk. . .	66—69	44—47	...

*Ex Div.

Bethnal Green Public Lighting Charge.—The Bethnal Green Borough Council report that the Commercial Gas Company have given notice that, as and from Sept. 30, the charge per annum for street lighting in their area will be: One light inverted (without pilot), £5 6s. 4d.; three lights inverted (without pilot), £14 11s.; five lights inverted (without pilot), £23 3s. 8d.; and day and night lamps (one light), £9 19s.

Broadway Gas Company.—The question of the future lighting of the picturesque Worcestershire village of Broadway was considered at a recent public meeting. It was stated that the Company had been working more or less at a loss for the past four years, and fresh capital was necessary. A resolution was passed appointing a Committee to take the necessary steps with a view to the strengthening of the Company's position.

Birmingham Gas Consumers' Rebate.—In view of the fact that the rebate of 8d. per 1000 c.ft. granted to consumers of gas for domestic purposes last quarter has not absorbed the whole of the money received from the Government in respect of coal supplied to the Birmingham Gas Department, the Committee have decided that a similar rebate shall be allowed to the consumers concerned during the current quarter. It is anticipated that this will dispose of the balance of the money received from the Government for this purpose.

A fire occurred last week at the tailors' shop of Pickering & Sons, Clarence Street, York, it is supposed through the fusing of a gas-pipe by the contact of an electric wire running alongside.

Messrs. Vickers, Ltd., of Broadway, S.W., have opened a depôt for Wales and the South-West of England at No. 43, Park Street, Bristol, at which address they will be glad to receive inquiries for their products.

The Metropolitan Gas Company of Melbourne have cabled their London Agents (Messrs. John Terry and Co.) that the profits for the half year to June 30 were £63,759. A dividend for the six months has been declared of 6s. 6d. per share, and a balance of £50,638 has been carried forward. Dividends to absentee shareholders will be posted by an early mail after Aug. 1.

The accounts of the Aldershot Gas, Water, and District Lighting Company's Hospital and Benevolent Fund (of which Mr. R. W. Edwards is Chairman) show total subscriptions for the year ended June 30 of £154, of which £51 has been allocated to hospitals, &c. The reserve fund now stands at £200. A sum of £63 has been granted by the Committee in special cases. During the 3½ years' existence of the fund, £170 has been distributed among the various homes and hospitals, and £78 has been granted in cases needing special help.

The Barrow Corporation have agreed to become members of the Federation of Gas Employers.

Mr. G. J. Jackson and Mr. F. B. Richards have been appointed to the Board of Arthur Duckham and Co. (1920), Ltd.

The Doncaster Corporation are increasing the charge for gas from 4s. 6d. to 5s. 3d. per 1000 c.ft. At a meeting of the Lancaster Town Council, Mr. Till (the Chairman of the Gas Committee) said that, with increased railway charges, wages, &c., it was anticipated that the price of gas would in September have to be increased by at least 6d. per 1000 c.ft.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for July 28.]

Nos. 21,592—22,168.

ADLER, R.—"Purification, &c., of gases." Nos. 21,847, 21,848.
BRAACH, P.—"Gas-cooker." No. 21,688.
CASBON, W.—"Incandescent gas-burners." No. 21,788.
DAVIS, R. H.—"Apparatus for detection and estimation of carbon monoxide." No. 21,785.
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1. Authorizing the Directors from time to time to issue any Capital which still remains to be raised under the Provisions of the Crystal Palace District Gas Act, 1893, and the South Suburban Gas Acts, 1912 and 1918.
2. Authorizing the Directors from time to time to exercise the Borrowing Powers of the Company.

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By order of the Board,
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